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NOTES ON HYBRID BERBERIS AND SOME OTHER GARDEN FORMS

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During my stay at the Arnold Arboretum from 1915 to 1919 I had the opportunity to study some forms of Berberis most of which have been in cultivation for a long time, and are, apparently, of hybrid origin. I have taken a keen interest in these forms since I published in 1906 my remarks on the Berberis of Schrader's Herbarium preserved at St. Petersburg (see Mitt. Deutsch. Dendrol. Ges. xiv. 111-124). In 1838, Schrader described in vol. xii of Linnaea a number of Berberis species mostly from plants cultivated in European gardens. Some of his forms are very doubtful, and I have not been able to elucidate them. Besides the forms already mentioned by Schrader I have found many more in the great collections in Europe and America; and I wish today to draw attention at least to some of these. Unfortunately I have not been able to finish my studies on all the cultivated forms of Berberis, but some of these which I am going to describe are of no small value as garden plants.

× *Berberis emarginata* Willdenow, Enum. Pl. Hort. Bot. Berol. 395 (1809); Berl. Baumz. ed. 2, 53 (1811).—Guimpel, Otto und Hayne, Abb. Fremd. Holzart. 78, t. 68 (1819-1825).—Schneider in Mitt. Deutsch. Dendr. Ges. xv. 178 (1907).

B. emarginata var. *latifolia* Tausch in Flora xxi. 799 (1838).

B. dentata Tausch, l. c. (1838), incl. var. *latifolia* et var. *capitata*.

B. vulgaris var. *emarginata* Gordon in Gard. Mag. n. s. vi. 2 (1840).

B. vulgaris var. *microphylla* Regel in Act. Hort. Petrop. ii. 414 (1873).

Frutex erectus, dense ramosus, habitu *B. sibiricae*, 0.4-0.8(-1.2) m. altus; ramuli annotini flavescentes, sed plerique rubescentes vel purpurascentes, laeves, ut biennes flavo-cinerei angulato-sulcati, vetustiores cinerascentes; internodia 1-2 cm. longa; spinae satis debiles, pleraeque 3-fidae, interdum simplices vel 5-7-fidae, flavescentes, mediae ad 12 mm. longae, subtus sulcatae. Folia 4-7-fasciculata, inaequalia, matura membranacea, ramulorum fertilium obovato-oblonga vel obovato-lanceolata, apice acuta vel obtusa, mucronulata, basim versus in petiolum subnullum vel brevem sensim attenuata, margine dentibus gracilibus 0.5-1 mm.

longis utrinque circiter 6–12 serrulata, 1.3–4 cm. longa et 0.5–1.5 cm. lata, superne saturate viridia, subtus pallidiora, pruinosa, margines cellularum epidermidis utriusque faciei undulatae (subtus distinctius); folia ramulos novellos fulcientia surculorumque saepius majora, ovato- vel obovato-elliptica, minus dense sed interdum grossius serrata, ad 4 : 2.1 cm. magna vel versus apicem surculorum minora sed satis latiora circiter 2 : 1.8 cm. magna, subintegra. Inflorescentiae pleraeque breviter racemosae, apicem ramulorum versus fasciculato-racemosae, densiflorae, circiter 5–16-florae, 1–3 cm. longae, nutantes; pedicelli 5–8 mm. longi, graciles, apice leviter incrassatae bracteis lanceolatis acuminatis 2–3 mm. longis suffulti; flores lutei, 8–10 mm. diametentes; sepala externa vel prophylla bracteiformia, media ovato-oblonga vel elliptica, interna iis $\frac{1}{3}$ majora, latiora, obovato-elliptica, 5–5.5 mm. longa; petala obovato-oblonga, 4.5–5 mm. longa, apice distincte inciso-emarginata, basi subunguiculata, glandulis 2 irregulariter ovoideis satis magnis paullo distantibus aurantiacis praedita; stamena petalis $\frac{1}{3}$ breviora, subapiculata; ovarium ellipticum, stigmate lato, ovulis ut videtur saepissime 3, interdum 2 vel 4 subsessilibus. Fructus maturi elliptici, circiter 9–11 mm. longi, 4.5–6 mm. crassi, stylo brevissimo vel indistincto excluso, saturate coccinei, leviter pruinosi; semen plerumque 1, circ. 7 mm. longum, purpureo-brunneum, minutissime punctulatum.

Of this form I have seen the author's type preserved at Berlin. Willdenow states that it came from "Siberia" but there is no wild species or variety known from Asia that agrees with it. In 1811, Willdenow himself says: "Ein drei bis vier Fuss hoher Strauch, der beim ersten Anblick der vorhergehenden Art (*B. vulgaris*) ähnlich zu sein scheint, aber in der Blattform und im feineren Ansehen der sibirischen Berberitze viel näher verwandt ist." Therefore Willdenow himself indicates that *B. emarginata* is intermediate between *B. vulgaris* and *B. sibirica*, and there can not be the least doubt that it is a hybrid between these two species. The form described by me is almost identical with the one figured by Guimpel. In the Arnold Arboretum I saw plants that came from Highland Park at Rochester, N. Y., under no. 16 as *B. sibirica* which approach more nearly *B. vulgaris*.

K. Koch, Dendr. I. 398 (1869), declares that *B. emarginata* is "Ohne Zweifel" a cross between *B. canadensis* and *B. sibirica*, but no trace of the first species can be detected in any plant of *B. emarginata* which I have seen. Regel says of his *B. vulgaris* var. *microphylla*: "Videtur forma hybrida hortensis inter *B. vulgarem* et *B. sibiricam*." The real *B. emarginata* he confuses with some oriental forms of very different relationship.

Being a hybrid, somewhat different forms of *B. emarginata* may be met with in gardens but there seems no need to give them varietal names. I wish, however, to call attention to the following form which looks like a distinct variety or may have had its origin in a cross of *B. emarginata* with a form of *B. amurensis*.

Berberis emarginata var. britzensis, var. nov.

Frutex ramosus, vix ad 1 m. altus; ramuli annotini leviter brunnescentes vel cinereo-brunnei, valde sulcati, biennes cinerascentes, vetustiores cinereo-nigrescentes; internodia 1.5–2 cm. longa; spinae 3-fidae, brunnescentes vel flavescentes, subtus sulcatae, mediae 0.5–2 cm. longae, lateralibus longiores. Folia ad 8-fasciculata, inaequalia, matura crasse papyracea, ramulorum fertilium oblanceolata vel anguste elliptica, apice acuta, basi sensim in petiolum ad 5 mm. longum attenuata, margine densissime graciliter serrulata serraturis 0.5–1 mm. longis circiter 4–5 pro 5 mm., minimis exceptis 2.5–4 cm. longa et 0.7–1.3 cm. lata, superne saturate viridia, indistincte reticulata, subtus laete viridia, paullo discoloria, distincte anguste elevato-reticulata (margines cellularum epidermidis utriusque faciei aequimagnarum subrectae vel paulo undulatae); folia ramulos novellos fulcientia aliis similibus sed ad 5:1.5 cm. magnis interdum grossius serrulata, surculorum elliptica vel ovato-elliptica, distantius et saepe longius ad 4.5:1.8 cm. magna, subtus pruinosa. Inflorescentiae racemosae, ad 4 cm. longae, subdensae, pendentes; pedicelli 8 (infimi) vel 5–6 mm. longi, bracteis lanceolatis acutis ad 2 mm. longis suffulti; flores aperti circiter 7 mm. diametentes, ?lutei; sepala externa (prophylliformia) minima, late triangularia, mediis late ovatis duplo minora, interna ovato- vel obovato-elliptica, circiter 4.5 mm. longa; petala oblongo-elliptica, circiter 5 mm. longa, apice emarginata, basi haud vel paullo unguiculata, glandulis 2 aurantiacis mediocribus oblongis separatis praedita; stamina petalis $\frac{1}{3}$ breviora, apice truncata; ovarium ovato-ellipticum, stigmate satis lato, ovulis 2–3 sessilibus instructum. Fructus ut videtur coccinei, leviter pruinosi, elliptici vel obovato-elliptici, circiter 9:4 mm. magni, estylares; semen 1, purpureum, levissime punctulatum.

This form has been distributed by L. Späth of Berlin under the name of *B. cretica* according to a specimen from Highland Park, Rochester, N. Y. (no. 26, June 5 and October 15, 1907). It is very similar to *B. emarginata* and conspicuous by its densely and finely serrate leaves. It has not been possible to trace its origin, and it needs further observation.

Berberis provincialis Audibert apud Schrader in Linnaea XII. 381 (1838).—Schneider in Mitt. Deutsch. Dendr. Ges. xv. 181 (1907).

Berberis vulgaris var. *provincialis* Audibert, Cat. 1831/2, pt. 2, p. 6, nom. nud.

Frutex ut videtur dense ramosus, altitudine incerta (ex cl. Schrader probabiliter “5–6 ped.”); internodia circiter 1.5 mm. longa; spinae 1–3-partitae, graciles, flavo-brunnescentes, mediae subtus sulcatae, ad 1 cm. longae vel surculorum longiora. Folia 3–6-fasciculata, inaequalia, matura chartacea, ramulorum fertilium anguste oblonga vel ovato-oblonga, apice obtusa vel subacuta, basi in petiolum brevem attenuata, margine graciliter setoso-serrulata dentibus utrinque circiter 6–12 infimis ad 1.5 mm. longis, superne intense viridia, nitida, subtus laete viridia discoloria,

utrinque laxe reticulata, 1.5–2 cm. longa et 7–9 mm. lata vel ad 2.5 cm. longa et ad 1.2 cm. lata; folia ramulos novellos fulcidentia ultra 3 cm. longa, ovato- vel obovato-oblonga, in petiolum longiore attenuata, surculorum elliptica vel ovato-elliptica, basi cuneata breviter petiolata, ad 4.5 cm. longa et ad 2.3 cm. lata, grossius serrulata, subtus glaucescentia. Inflorescentiae breviter racemosae vel fasciculato- (vel subumbellato-) racemosae, rarius elongatae et nutantes, 1–3 cm. longae; flores aperti nondum visi. Fructus elliptici, coccinei, circ. 8–9 : 5 mm. magni, fere semper estylares.

According to Schrader, whose type I have seen, he received this form from Audibert at Tarascon and also as *B. ilicifolia* from the Botanical Garden at Vienna. I have seen a "catalogue des Pépinières des Frères Audibert à Tonelle, près de Tarascon" of the year 1831/2. Here a *Berberis vulgaris* v. *provincialis* "de provence" is mentioned. This seems to point to a wild form of *B. vulgaris* from the southwestern parts of France, but I have not found in books any mention of a wild form agreeing with Schrader's description. In a note he says: "*B. provinc.* forte ad prim. sect. refer. cum ramis minus rubris et flor. cum *vulgari*." I am, however, not sure whether the form from Vienna and that from Tarascon really were of the same origin. As I stated in 1906 the form preserved in Schrader's Herbarium is very similar to the form described by Koehne as *B. serrata*, and there is a reasonable chance that both are of the same origin. The true *B. serrata* is a very distinct form recognized at the first glance from *B. provincialis* by its very acute leaves. In the Arnold Arboretum, however, I found, under no. 5886–1, plants raised from typical *B. serrata* (no. 18 ex Rochester) that show a closer similarity to *B. provincialis* than to typical *B. serrata* (as represented by Herb. Dendr. Koehne no. 463). I therefore feel justified in regarding *B. serrata* as a mere variety of what I consider according to Schrader *B. provincialis*. It would be interesting to raise from seeds several generations of this hybrid in order to trace its real parents. One of them is doubtless *B. vulgaris*. The presence sometimes of three ovules, the character of the inflorescence, the shape of the petals, the appearance of the leaves and spines and the color of the twigs indicate *B. sibirica* as the second parent, but the typical *B. emarginata* has larger flowers and inflorescences. After all, *B. provincialis* may be of very similar origin as *B. emarginata*.

***Berberis provincialis* var. *serrata*, nov. var.**

B. serrata Koehne, Deutsche Dendr. 170 (1893).

B. microphylla var. *serrata* Hort. Kew, in a MSS-list of 1884.

Frutex ex auctore 0.6 m. altus, ramis erectis squarrosis; ramuli annotini flavo-rubri vel satis rubescentes, distincte sulcati, laeves, etiam biennes cinereo-brunnei, vetustiores nigrescentes; internodia 1–1.5 cm. longa; spinae graciles, 1–3-fidae, flavescentes, vel rubescentes, mediae ad 10 mm. longae, subtus sulcatae. Folia 4–8-fasciculata, inaequalia, matura chartacea,

ramulorum fertilium lanceolata vel oblanceolata, apice acuta, basim versus in petiolum brevem attenuata, satis argute graciliter serrata dentibus 0.5–1.5 mm. longis utrinque 6–10(–12), superne vivide viridia, nitida, subtus vix vel paullo pallidiora, utrinque laxe elevato-reticulata, minimis exceptis 1–2(–2.3) cm. longa et 3–6 mm. lata; folia ramulos novellos fulcientia surculorumque late lanceolata, grossius serrulata (serraturis ad 3 mm. longis), ad 3.3 cm. longa et 1 cm. (dentibus exceptis) lata, subtus saepe distincte glaucescentia. Inflorescentiae pleraequae dictinete breviter racemosae vel saltem versus apicem ramulorum fasciculato-racemosae, circiter 6–15-florae, ad 3 cm. longae; pedicelli graciles, 5–8 (infimi ad 10) mm. longi, bracteis lanceolatis acuminatis 2–3 mm. longis suffulti; flores aurei, circiter 6 mm. diametentes; sepala externa (prophylliformia) parva triangularia vel ovata, media obovato-oblonga, illis duplo majora, interna mediis similia circiter $\frac{1}{4}$ longiora, 5 mm. longa; petala 5–6 mm. longa, obovato-oblonga, apice inciso-emarginata, basi leviter attenuata, glandulis 2 ellipticis distinctis separatis aurantiacis praedita; stamna petalis $\frac{1}{3}$ breviora, apice fere truncata; ovarium ellipticum, stigmate lato crasso sessili, ovlis 2–3 subsessilibus. Fructus elliptici, coccinei, circ. 7 : 4 mm. magni, estylares; semina 1–2, cinnamomea, levissime punctata, circiter 5 mm. longa.

Koehne in 1893 apparently described his species from plants in the Botanical Garden at Berlin called *B. microphylla serrata*. In the Kew Garden List mentioned above this form is said to have been received from R. McCleland, and the remark is added: "is *B. serratifolia*, Poir. Habitat unknown." Poiret, however, never described such a species; in 1808 he only mentions under *B. cretica*: "Eadem, foliis dentato-ciliatis, ovatis, obtusis." This form De Candolle in 1821 refers to as "*B. cretica*, *serratifolia* foliis serrato-ciliatis, Poir. l. c." Not having seen the specimens of Poiret or De Candolle I cannot elucidate their forms. They may belong to *B. nitens* which apparently is a cross of *B. cretica*. In *B. provincialis* and its var. *serrata*, however, the stomata in the upper surface of the leaves so characteristic of those of *B. cretica* are entirely absent.

Like *B. emarginata*, *B. provincialis*, especially its variety *serrata* are handsome shrubs densely covered with golden flowers in May. Both are well worth wide distribution in gardens.

Berberis kewensis, n. sp. vel hybr.

Frutex ramis elongatis habitu probabiliter *B. aristatae*; ramuli annotini purpureo-brunnescentes, leviter angulato-sulcati, laeves, biennes cinerascentes vel sordide cinereo-brunnei, vetustiores cinerei; internodia 1.5–2.5(–3) cm. longa; spinae 3-fidae, rarius simplices, flavescentes, divaricatae, mediocres vel satis validae, mediae 0.6–2.2 cm. longae, lateralibus saepissime longiores.

Folia 4–8-fasciculata, inaequalia, matura satis crasse chartacea, ramulorum fertilium anguste elliptica, vel ovato-elliptica, apice obtusa vel brevi-acuta, mucronulata, basi subsensim in petiolum ad 5 mm. longum contracta, margine graciliter spinoso-serrata dentibus brevibus circiter 1–1.5 mm. longis utrinque 5–10 vel subintegerrima, superne intense viridia, subtus discoloria, pruinosa, utraque pagina laxe elevato-reticulata (margine cellularum epidermidis faciei superioris subrectae inferioris distincte undulatae), minimis exceptis 2.5–5 cm. longa, 0.9–2 cm. lata, ramulos novellos fulcientia majora, grossius spinoso-serrata, ad 5.5 : 1.5 cm. magna, late elliptica, interdum longius petiolata, surculorum late ovato-vel obovato-elliptica, obtusiora, ad 5 : 3 cm. magna, subtus distinctius albescens, grossius subsinuato-serrata, vel satis parva, late elliptica et integerrima. Inflorescentiae distincte elongato-racemosae, pedicellis saepissime a basi incipientibus, interdum basi nudae sed saepe ima basi floribus singulis longius pedicellatis additis, nutantes pendentesve, circiter 15–20-florae, 4–8 cm. longae, iis *B. aristatae* valde similes; pedicelli fructiferi satis crassi, plerique rubescentes, 5–10 (infimis longioribus exceptis) cm. longi, apice satis incrassati, bracteis ovato-triangularibus acutis vel acuminatis 2–2.5 mm. longis suffulti; flores ut videtur aurei, aperti circiter 10 mm. diametentes; sepala externa bracteiformia, parva, media late ovata, internis late obovatis basi contractis circiter 6 mm. longis duplo minora; petala sepalis internis similia, interdum ad 6.5 mm. longa, apice integra vel levissime emarginata, basi contracta, glandulis 2 aurantiacis mediocribus breviter ovato-oblongis praedita; stamna petalis $\frac{1}{3}$ – $\frac{1}{4}$ breviora, apice vix apiculata; ovarium ellipticum stylo brevi, stigmate mediocri coronatum, ovulis 2–3 subsessilibus instructum. Fructus 10–12 : 5–6 mm. magni stylo brevi distincto excluso, atroviolacei, pruinosi; semina 1–2, cinnamomea, levissime punctulata, circiter 7–7.5 mm. longa.

This interesting plant I have not yet been able to study in a living state. It came to the Arnold Arboretum from Kew under the name of *B. Lycium* and flowered in the Arboretum in May, 1900. Fruits also were collected there by A. Rehder in September, 1900 and November 1, 1902 (no. 1781–5, olim 3243). In the Arboretum it received the name *B. aristata*, and the leaves, flowers, and fruits do, indeed, much resemble those of that species and nothing points to *B. Lycium* Royle. The angulate and distinctly purple or purple-brown branchlets which are brownish-gray even in the second year make it impossible to regard this form as a mere variety of *B. aristata* DC. It may possibly be a distinct species raised at Kew from East Indian seeds, and of all the species known to me from the Himalayas it comes nearest to *B. Huegeliana* Schneid., the type of which has yellow-brown twigs and is not yet in cultivation. Of *B. chitria* Hamilt., which was introduced at least a hundred years ago, I cannot detect any influence upon *B. kewensis*. No specimen which I have seen shows a trace of a paniculate inflorescence. I do not know whether this well marked form is still in cultivation.

Berberis hauniensis, nov. spec. vel hybr.

Frutex ut videtur satis dense subelongato-ramosus; ramuli annotini, flavo-rubri vel ut biennes sordide rubro-brunnei, distincte angulato-sulcati, lenticelosi sed satis laeves, vetustiores nigro-cinerascentes; internodia 1-2 cm. longa; spinae simplices, patentes, brunnescentes, 1-2 cm. longae, subitus sulcatae vel 3-fidae et laterales mediis breviores.

Folia ad 8-fasciculata, inaequalia, matura tenuiter chartacea vel chartacea, ramulorum fertilium obovato-oblonga vel anguste oblonga, apice fere semper obtusa vel rotundata, basim versus subito in petiolum ad 5 mm. longum attenuata, margine integerima vel satis minute serrulata, dentibus gracilibus utrinque 4-5 vix 1 mm. longis, superne intense viridia, subitus discoloria et pruinosa, utraque pagina laxe tenuiter elevato-reticulata (margines cellularum epidermidis utriusque faciei aequimagnarum rectae vel subrectae), minimis exceptis 2-4 cm. longa et 0.9-1.7 cm. lata; folia ramulos novellos fulcientia saepe oblongiora, acutiora, grossius serrata, ad 5.5 : 2 cm. magna petiolis ad 1 cm. longis inclusis, surculorum majora, obovato-oblonga vel obovato-elliptica, saepissime densius breviserrata, ad 6 : 2.5 cm. petiolis inclusis magna. Inflorescentiae inferiores distincte paniculato-racemosae, superiores racemosae, omnes densiflorae, 10-20-florae, nutantes, 2-3.5 cm. longae, rubescentes, axis satis tenuibus; pedicelli gracie 4-6 mm. longi basi bracteis anguste lanceolatis acuminatis 2-3 mm. longis suffulti; flores ut videtur aurei et extus paullo rubescentes, aperti circiter 8 mm. diametentes; sepala externa triangulari-lanceolata, mediis elliptico-oblongis minora, interna circiter 5 mm. longa, obovata; petala circiter 6 mm. longa, satis anguste elliptica, apice distincte inciso-emarginata, basi vix contracta, glandulis 2 distantibus aurantiacis satis parvis oblongis separatis praedita; stamina petalis fere duplo breviora, apice vix vel brevissime apiculata; ovarium elliptico-oblongum stylo nullo vel indistincto, stigmate mediocri, ovulis 2(-1) subsessilibus. Fructus ut videtur elliptici, ? cerasini, circiter 10 mm. longi et 5 mm. crassi, estylares vel stylo brevissimo coronati; semen fere semper 1, cinnamomeum, levissime punctulatum, circiter 6 mm. longum.

This is another striking form of very uncertain origin. I received from the Botanical Garden at Copenhagen flowering specimens of June 10th and fruiting specimens of October, 1916, under the name *B. cretica*. The lower parts of the dense inflorescence is distinctly paniculate and, so far as the inflorescence is racemose, it resembles that of *B. emarginata* Willd. The texture and dentation of the leaves is not unlike those of *B. aristata* DC. The fruit sometimes shows a short distinct style but I have never found more than two ovules. The somewhat paniculate inflorescence seems to indicate an influence of *B. chitria* Hamilt., while the structure of the flowers in some respect is similar to that of *B. emarginata* or *B. provincialis*. The spines resemble those of *B. aristata* or *B. chitria*. The bracts are relatively long and acuminata as in *B. chinensis* Poir. There are no stomata on the upper surface of the leaves, and nothing indicates that *B. cretica* may be one of the parents.

Berberis macracantha Schrader in Linnaea, xii. 356 (1838).—Schneider in Mitt. Deutsch. Dendr. Ges. xv. 176 (1907).

Frutex divaricato-ramosus, squarrosum, ad 3–4 m. altus, ramis satis crassis elongatis; ramuli annotini flavo-cinerei vel interdum leviter brunnescentes vel hornotini ex parte violascentes, teretiusculi vel angulatosulcati, laeves, biennes vetustioresque cinerascentes; internodia 1.5–3 cm. longa; spinae 1–3-fidae, ramorum vetustiorum debiles minores, ceterum satis validae, applanatae, subtus sulcatae, flavo-brunnescentes, mediae ad 3 cm. longae, lateralibus longiores. Folia ad 8-fasciculata, inaequalia, matura chartacea vel satis crassa, ramulorum fertilium ovalia vel obovato-elliptica, apice obtusa vel rotundata, rarius acuta, mucronulata, basi satis subito vel sensim in petiolum subnullum vel fere ad 1 cm. longum contracta, superne intense viridia, subtus laete viridia vel cinerascentia et pruinosa, utroque latere pleraque laxe modo *B. aristatae* elevato-reticulata, rarius nervatione ad *B. vulgaris* magis accendentia, margine remote spinuloso-serrulata, dentibus 0.5–1 mm. longis patentibus utrinque 5–15 (margines cellularum epidermidis faciei superioris semper rectae visae, inferioris interdum ab illis non diversae sed saepe satis distincte undulata), minimis exceptis 2.5 : 1 ad 4.5 : 2 cm. petiolis inclusis magna; folia ramulos novellos fulcientia satis anguste obovato-oblonga, ad 6.5 : 2 cm. magna petiolis ad 1.5 cm. longis inclusis, surculorum iis similia vel apicem versus minora, elliptico-rhomboidea, acuta, integerrima. Inflorescentiae elongato-racemosae, satis laxiflorae, inferne nudae vel pedicellis basim incipientibus, nutantes vel pendentes, (8–)10–25-florae, fructiferae ad 7–10 cm. longae; pedicelli interdum ex parte subverticillati, 5–10 mm. longi, infimi saepe longiores, fructiferae graciles vel subcrassae, apice incrassatae, bracteis lanceolatis acuminatis 1.5–2.5 mm. longis suffulti; flores lutei, extus saepe rubescentes, aperti 7–10 mm. diametientes; sepala externa prophylliformia triangularia acuta parva, media illis duplo majora, late ovata vel ovato-elliptica, interna similia vel obovata 6 mm. longa; petala obovato-elliptica, apice integra vel leviter emarginata, basi paullo attenuata, glandulis 2 distinctis separatis aurantiacis oblongo-ellipticis praedita; stamina petalis $\frac{1}{2}$ – $\frac{1}{4}$ breviora, apice levissime apiculata vel subtruncata; ovarium ovato-ellipticum, stylo brevi, stigmate mediocri, ovulis 2–4(–5) instructum. Fructus elliptici vel ovato-elliptici, purpureo-violacei (cerasini) vel sanguinei, subpruinosi, 8–10 : 5–6 mm. magni, stylo satis brevi coronati vel estylares; semina 1–2, purpureo-brunnea, levissime punctulata, 5–5.5 mm. longa.

With regard to the origin of this plant Schrader says: "*Berberis macracantha (pennsylvanica)* B. ex America 1830." This seems to be the reason for regarding this form as a presumable cross between *B. canadensis (caroliniana)* and *B. aristata*. I cannot accept this view of its origin. It looks to me more like a hybrid of *B. vulgaris* with *B. aristata*. I have found it also under the name *B. Fischeri*. This name is first mentioned by Koch in Wochenschr. Ver. Bef. Gartenb. Preuss. Staat. iv. (1861),

p. 94 as a purple-leaved form of *B. canadensis*. *B. Fischeri* of Kirchner, Arb. Musc. 135 (1864) came from the nurseries of F. Bøoth & Sons at Flottbeck, and seems to be the same as plants I have had before me which well agreed with *B. macracantha*. Kirchner says, "ein ausgebreiteter Strauch mit rutenförmigen Zweigen," a description fitting at least one form of our hybrid. Of the same origin seems to be the following variety which I wish to propose.

Berberis macracantha var. pulchra, nov. var. (vel probab. planta hybrida origine diversa).

Frutex ut videtur satis tenuiter elongato-ramosus; ramuli annotini flavescentes vel sordide cinereo-brunnescentes, rarius distinctius saturate brunnescentes, paullo vel versus apicem distinctius angulati, biennes cinerascentes, teretiusculi, vetustiores cinerei; internodia 2–3.5 cm. longa; spinae pleraeque 3-fidae, divaricatae vel versus apicem ramulorum simplices, flavo-brunneae, teretiusculae, subtus sulcatae, mediae 0.5–2 cm. longae, lateralibus longiores. Folia ad 8-fasciculata, inaequalia, matura chartacea, satis crassa, ramulorum fertilium oblanceolata vel anguste obovato-lanceolata vel subspathulata, apice obtusa vel breviter acuta, mucronulata, basi sensim in petiolum subnullum vel ad 5 mm, longum attenuata, margine basi excepta distincte sed graciliter spinuloso-serrata dentibus patentibus 0.5–1 mm. longis utrinque circiter 8–15, superne saturate viridia, subtus pleraque laete viridia, utraque facie satis anguste elevato-reticulata (cellularum margines epidermidis faciei superioris levissime undulatae, inferioris distincte undulatae), minimis exceptis 2 : 0.8 ad 4.5 : 1.6 cm. magna; folia ramulos novellos fulcientia majoribus ramulorum fertilium similia, sed ad 5.5 : 1.8 cm. magna petiolo longiore inclusa, surculorum latiora, ovato-elliptica, grossius remote et interdum subsinuato-serrata, apice obtusiora, basi subito in petiolum ad 8 mm. longum contracta, ad 5 : 2.5 cm. magna, subtus fere semper distincte pruinosa, laxius reticulata. Inflorescentiae elongato-racemosae, pedunculo ad 2.5 cm. longo inclusa ad 4 cm. longae, 5–8-florae, cum ramulis pendentes, rubescentes; pedicelli interdum versus apicem pedunculi subverticillatim aggregati, 5–7 mm. longi, bracteis anguste lanceolatis acuminatis ad 3 mm. longis suffulti; fructiferi apice leviter incrassati; flores ut videtur aurei, aperti circiter 9–10 mm. diametentes; sepala externa prophylliformia anguste triangularia mediis obovato-ellipticis duplo minora, interna late obovata, mediis fere duplo longiora, ad 7 mm. longa; petala 6.5–7 mm. longa, late elliptica, apice rotundata, integra, basi paullo contracta, glandulis 2 ovoideis distinctis aurantiacis separatis praedita; stamna petalis $\frac{1}{3}$ breviora, apice truncata vel vix leviter apiculata; ovarium ovatum stylo distincto, stigmate mediocri, ovulis plerisque 3 subsessilibus. Fructus elliptici ut videtur cerasini et pruinosi, 10–11 : 5–6 mm. magni, stylo distincto ad 0.5 mm. longo excluso; semen plerumque 1, purpurascens, fere laeve.

This form came to the Arnold Arboretum in 1892 from Kew Gardens. It flowered at the Arboretum on May 29, 1898, and fruits were collected by A. Rehder on September 27 of the same year as well as on November 5, 1902 (no. 1781-4, olim 2766). The specimen of September 27, 1898, has rather dark brown young twigs which make it unlikely that it has the same origin as *B. macracantha*. There should be made artificial crosses of *B. aristata* with *B. sibirica* and with *B. canadensis*. We need some experimental proofs, and it may be that certain characters of hybrids are not to be found in either parent as according to Rehder seems to be the case in some *Philadelphus*-hybrids.

× *Berberis Parsonsii*, hybr. nov.

Frutex ut videtur laxe elongato-ramosus; ramuli annotini flavo-rubri vel fere rubro-purpurascentes, angulato-striati, laeves, biennes cinereo-brunnei, vetustiores cinerascentes; internodia 2-3.5 cm. longa; spinae satis validae, pleraeque 3-fidae, patentes, flavo-brunneae vel flavae, subtus applanatae vel subsulcatae, mediae ad 2.7 cm. longae, lateralibus longiores. Folia ad 7-fasciculata, inaequalia, matura satis crasse chartacea, ramulorum fertilium obovato-oblonga vel -elliptica, apice brevi-acuta vel obtusa, mucronulata, basi cuneata, in petiolum subnullum attenuata, 2 : 0.9 ad 4 : 1.6 cm. magna, margine subintegerrima vel spinuloso-dentata dentibus utrinque 2-6 patentibus 1-3 mm. longis, superne saturate viridia, subtus valde discoloria, albescens vel glaucescentia, pruinosa et sub microscopio paullo papillosa, utraque pagina valde laxe elevato-reticulata, ramulos novellos fulcientia vel surculorum aliis similia, saepe elliptica acutiora. Inflorescentiae elongatae, valde laxiflorae, 5-7 cm. longae pedunculo 2-3.5 cm. longo incluso, racemosae vel subumbellato-racemosae et saepe ex parte paniculatae, rubescentes, patentes (vel pendulae vel ramis pendentibus?; pedicelli (1-)1.5-2 cm. longi, fructiferi apice leviter incrassati bracteis lanceolatis acuminatis 2.5-3 mm. longis suffulti; flores satis magni, aperti, ut videtur 12-13 mm. diametentes, aurei?, an extus rubicundi?; sepala externa late ovato-triangularia, mediis similibus vel late ovatis fere duplo minora, interna late elliptica vel obovata, 6-7 mm. longa; petala late obovata, circiter 7 mm. longa, apice emarginata, basim versus contracta, glandulis 2 distinctis sed parvis ovoideis separatis aurantiacis? praedita; stamina petalis $\frac{1}{3}$ breviora, apice truncata; ovarium elliptico-oblongum, stylo satis distincto, stigmate mediocri, ovulis 3-4 sessilibus. Fructus obovato-oblongi vel -elliptici, cerasini?, leviter, pruinosi, ad 14 : 5-6 mm. magni, stylo distincto circiter 1 mm. longo excluso; semina perfecte matura nondum visa.

This is a remarkable plant which came to the Arboretum in 1884 from the nursery of S. B. Parsons & Sons, Flushing, N. Y., as *B. umbellata*. It flowered on June 21, 1888, and fruits were collected on October 11, 1888 and October 9, 1889 (no. 2173-2, olim 1556). Unfortunately the plant died, and Parsons' nursery no longer exists. I am inclined to believe that

this Berberis is a cross between *B. chitria* and *B. Lycium*. To *B. chitria* point the brownish twigs, the large hardly papillose leaves, the partly paniculate inflorescence, and the long fruits, while the stiff inflorescence with the long pedicels, the distinctly pruinose and somewhat papillose leaves seem to indicate the influence of *B. Lycium*.

× *Berberis Spaethii*, hybr. nov.

Frutex squarrosus latus patenter ramosus, ad ultra 3 m. altus; ramuli annotini pallide flavo-brunnei, teretiusculi, laeves, biennes vetustioresque cinerascentes vel nigrescentes; internodia 2–3.5 cm. longa; spinae saepissime simplices, flavo-brunneae, teretiusculae, 0.5–2 cm. longae. Folia ad 8-fasciculata, inaequalia, matura chartacea, ramulorum fertilium elliptica, ovato-oblonga vel obovata, apice acuta, rarius obtusa, mucronulata, basi cuneata, in petiolum ad 5 mm. longum attenuata, minimis exceptis 3.5 : 1.5 ad 6 : 2.3 vel 5 : 2 cm. magna, margine satis distincte spinulososerrata dentibus utrinque 8–15 versus apicem decrescentibus 1–2 mm. longis patentibus, superne satis obscure viridia, subtus pallide viridia vel cinerascentia, pruinosa, utraque pagina laxe elevato-reticulata (margines cellularum epidermidis faciei superioris rectae, inferioris leviter undulatae); folia ramulosa novellos fulciantia aliis similia, interdum paulo longiora, surculorum late ovata vel elliptica, saepe subintegerrima, obtusiora, ad 5.5 : 3 cm. magna. Inflorescentiae paniculato-racemosae vel racemosae, satis densiflorae, ad ultra 6 cm. longae, axi satis crasso; pedicelli 5–8 mm. longi, apice leviter incrassati, bracteae novellae floresque juveniles satis evoluti nondum visi. Fructus elliptici, circiter 11 : 6 mm. magni, initio opaci, dein purpurascentes pruinosi, brevissime stylares; semina 2, circiter 7 mm. longa, atrobrunnea, levissime punctulata.

This is a very striking hybrid which came to the Arboretum in 1902 from the well known nurseries of L. Späth at Berlin-Baumschulenweg, with the name *B. angulizans* which is nothing but *B. canadensis* according to the figure by Massias in Hesdörffer's Monatsh. Blumenfreunde (1896) 100, tab. col. The plant, however, distributed by Späth under this name represents a hybrid of unknown origin. It flowered in the Arboretum in September 1906, and I collected fruits of the same plant in October, 1916 (no. 4578). It needs further observations and seems to represent a very remarkable form.

× *Berberis notabilis* Schneider in Silva Tarouca & Schneider, Uns. Freiland-Laubg. ed. 2, 116 (1922), nomen seminudum.

Frutex dense elongato-ramosus, squarrosus, ad 2.5 m. altus, ramuli annotini obscure brunnescentes vel cinereo-brunnei, teretiusculi vel striato-angulati, laeves, biennes satis cinerascentes, vetustiores cinerei; internodia 1.5–3 cm. longa; spinae simplices vel 3-fidae, patentes, brunnescentes, subtus sulcatae, mediae 5–15 mm. longae. Folia ad 7-fasciculata, inaequalia, matura satis chartacea, ramulorum fertilium obovato-oblonga vel

obovato-elliptica, apice rotundata, levissime mucronulata, basi satis subito in petiolum distinctum ad 13 mm. longum contracta, minimis exclusis 2.5 : 1.3 ad 5 : 2.2 cm. petiolis exclusis magna, superne satis glauco-viridia, subtus paullo discoloria et pruinosa, utraque pagina laxe elevato-nervata, (margines cellularum epidermidis utriusque faciei aequimagnarum levissime undulatae vel subrectae), margine fere semper sed saepe satis indistincte breviter serrata dentibus minimis vel ad 0.5 mm. longis utrinque ad 20; folia ramulos novellos fulcientia similia sed saepe majora, ad 7 : 4 cm. magna petiolis ad 2 cm. longis exclusis, surculorum minora, elliptica, interdum subintegerrima, circiter 3–3.5 cm. longa et 1.5 cm. lata, breviter petiolata, subtus distinctius pruinosa. Inflorescentiae elongato-racemosae, 14–20-florae, floribus basi incipientibus, fructiferae ad 6 cm. longae; pedicelli satis tenues, fructiferi 10–15 mm. longi, apice paullo incrassati, basi bracteis ovato-triangularibus acuminateis circiter 2 mm. longis suffulti; flores aurei, aperti circiter 10 mm. diametentes; sepala externa prophylloformia ovato-oblonga, media similia majora internis late ellipticis vel obovato-ellipticis circiter 6 mm. longis fere duplo minora; petala circiter 6 mm. longa, obovato-elliptica apice leviter emarginata, basi paulo contracta, glandulis 2 ellipticis distinctis aurantiacis separatis praedita; stamina apice vix vel paulo apiculata, petalis $\frac{1}{3}$ – $\frac{1}{4}$ breviora; ovarium elliptico-oblongum, stigmate sessili satis magno, ovlis 3–4 funiculo ovulo subaequilongo distincto stipitatis. Fructus ovato-elliptici, ad 15 : 10–11 mm. magni, estylares, cerasini et pruinosis; semina circiter 2, purpurea, levissime punctulata.

This fine large shrub has been in cultivation in the Arboretum under the name of *B. aristata*, of which I give a short account below. It was raised in 1895 from seeds collected from no. 67 which is *B. heteropoda* according to the material preserved in the herbarium. *B. notabilis* therefore undoubtedly represents a hybrid of *B. heteropoda*, and this origin is clearly shown by the characters of the leaves and by the distinctly stipitate ovules. The species which is to be regarded as the second parent I am not yet quite sure of. Some features point to *B. aristata* to which our plant is similar when flowering but *B. aristata* has leaves of a thicker texture and coarser serration, its racemes are not as large, and the fruits have shorter pedicels and short but distinct styles. The somewhat angular branchlets seem to indicate that a species of the *B. vulgaris* group may be the other parent. Whatever its origin this hybrid is a noble plant well worth cultivating.

Berberis aristata De Candolle, Syst. Nat. II. 8 (1821); Prodr. I. 106 (1824).—Schneider in Bull. Herb. Boiss. V. 451 (1905).

B. floribunda Lindley in Penny Cycl. IV. 261 (1835) pro parte, non Wallich.

This species was described by De Candolle from specimens in Herb. Lambert collected by Buchanan-Hamilton in Nepal which had been distributed by Buchanan under the name *B. chitria*. In his description

De Candolle says: "rami teretes, pallide grisei . . . racemi foliis paullo longiores, 2-3-pollicares, patuli, sat racemis *B. vulgaris* similes." Judging by this statement there can be no doubt as to the true *B. aristata*. Ker (in Bot. Reg. ix. tab. 729 [1823]) printed De Candolle's diagnosis but the plant figured is *B. chitria* Hamilton sensu Don (Prodri. Fl. Nep. 204 [1825]) which is an entirely different plant. Hooker f. et Thomson (Fl. Ind. i. 222 [1855]), too, did not separate *B. aristata* and *B. chitria*, and the last has been renamed *B. gratissima* by Klotzsch & Garcke (Bot. Ergeb. Reise Waldemar 130, t. 37 [1862]). Lindley in 1835 well distinguished the two species but he mistook *B. chitria* for *B. aristata*, and used for the latter the name *B. floribunda*.

According to Sweet (1826) and Don (1831) *B. chitria* was introduced into cultivation in 1820, and probably Wallich or another collector of his time introduced *B. aristata* at that time. Hamilton collected both species, and distributed them under the name *B. chitria*. Both are met with in European Gardens under such names as *B. coriacea*, *floribunda*, *asiatica*, *Wallichii*, *Wallichiana* and even *B. aetnensis*. *Berberis aristata* is a good garden plant, and the parent of quite a number of hybrids of which only a few can be dealt with in my present note. *Berberis coriaria* Royle (apud Lindley in Bot. Reg. xxvi. t. 46 [1841]) seems to be nothing but a variety of *B. aristata*. This plant was raised in the gardens of the London Horticultural Society from seeds sent by Royle in 1835, collected probably somewhere on the northwestern Himalayas. Unfortunately I have not found in any herbarium material from this region agreeing with Lindley's description and picture. A *Berberis coriaria* is mentioned by Kanjilal (For. Flor. 21 [1901]), by Collet, (Fl. Siml. 22 [1902]), and by Brandis (Ind. Trees, 30 [1906]), but I am quite unable to say what form these authors had in mind.

× *Berberis bella*, hybr. nov.

Frutex ut videtur vegetus, habitu *B. nummulariae*, ramis strictis elongatis; ramuli annotini purpurascentes et violascentes (pruinosi), laeves, leviter sulcato-angulati, biennes cinereo-fusci, subangulati, vetustiores nigrescentes; internodia 1.5-3 cm. longa; spinae infimae 3-partitae, ceterum simplices, validae, patentes, brunnei vel flavo-brunnei, subtus haud vel levissime sulcatae, applanatae, 1-4 cm. longae. Folia ad 8-fasciculata, inaequalia, matura rigide papyracea, ramulorum fertilium obovato- vel elliptico-oblonga, apice obtusa, rarius subacuta, minute mucronulata, basi cuneata, satis subito vel sensim in petiolum ad 1 cm. longum attenuata, integerima vel saepe parce serrata, dentibus utrinque 1-6 distantibus vix 0.5 mm. longis, superne glauco-viridia, subtus glaucescentia, paullo discoloria, utraque pagina satis laxe reticulata (margines cellularum epidemidis faciei superioris leviter undulatae, inferioris subrectae; stomata in pagina superiori et papillae in pagina inferiori desunt), minimis exceptis 2 : 0.8 ad 4 : 2 cm. magna; folia ramulos novellos fulcientia surculorum-

que ovato-elliptica vel ovato-oblonga acutiora, pleraque grossius distanter serrata, ad 5 : 2.2 cm. magna, petiolo vix 1 cm. longo inclusus. Inflorescentiae subspicatae, elongato-racemosae, densiflorae, iis *B. nummulariae* similes, 4–6 cm. longae pedunculo nudo ad 1.5 cm. longo inclusus; pedicelli fructiferi vix ultra 7 mm. longi, bracteis lanceolatis acuminatis iis 3-plo brevioribus suffulti; flores flavi?, aperti 7–8 mm. diametentes; sepala externa parva prophylliformia ovato-triangularia, media iis multo majora, ovato-elliptica vel obovato-oblonga, circiter 5.5 mm. longa, integerrima vel apice leviter emarginata, basi vix contracta, glandulis 2 oblongis mediocribus aurantiacis separatis praedita; stamina petalis fere duplo breviora, apice vix apiculata; ovarium ovato-oblongum, substylare, stigmate mediocri, ovulis 2 subsessilibus instrūctum. Fructus elliptico-oblongi vel ovato-elliptici, pallide rubri, circiter 10–11 mm. longi, 5–6 mm. crassi, estyulares vel stylo brevissimo coronati; semina 1–2, purpurascens, minutissime punctulata.

Unfortunately I have not been able to study this very remarkable hybrid in a living state. It originated in 1888 from seeds of a plant which had been raised in this Arboretum from seeds received in 1874 from the Jardin des Plantes at Paris under the name *B. cretica*. According to the material preserved in the herbarium this first plant was *B. crataegina* DC., or a form of it. Of *B. bella* I saw flowering specimens collected June 7, 1900, and fruiting ones of October 31, 1898 (no. 62-1). In the shape of the leaves, their bluish green color, the strong spines and the color of the twigs, as well as in its dense inflorescences *B. bella* much resembles *B. nummularia* var. *pyrocarpa* Schneid. but the fruits are of about the same size as those of *B. vulgaris*. We do not at present know enough of *B. crataegina* and its behaviour in cultivation to make a positive statement as to the origin of *B. bella*. I am not even sure whether *B. vulgaris* is one of the parents. There is, however, in the herbarium material of another form raised in 1898 from seeds of *B. bella* consisting of flowering branches collected May 25, 1906 (no. 62-2). It is almost identical with *B. vulgaris* but the leaves are very narrow. In the old shrub-collection of the Arboretum *B. bella* had its place between *B. oblonga* (no. 671-2) and a form of *B. vulgaris* (no. 1417; received in 1880 from Spaeth as *B. laxiflora*). This no. 62-2 looks to me like a cross between *B. bella* and no. 1417, but not having seen young shoots and fruits I am unable to make a definite statement about it.

× Berberis durobrivensis, hybr. nov.

Frutex habitu ignoto, ramuli annotini rubro-brunnei vel novelli olivacei, sulcato-angulati, pruinosi, laeves, minute lenticellosi, biennes subteretiusculi, vetustiores nigro-cinerei; internodia 1–1.8 cm. longa; spinae debiles, simplices vel 3-fidae, flavae vel flavo-brunneae, mediae 3–8, vix ad 10 mm. longae. Folia ad 8-fasciculata, inaequalia, matura crasse papyracea, ramulorum fertilium oblanceolata vel anguste obovato-oblonga, apice

satis obtusa, basi sensim in petiolum subnullum vel ad 6 mm. longum attenuata, margine satis indistincte brevissime subdistanter denticulato-serrata vel subintegerrima, minimis exceptis 1.5 : 0.5 ad 2.8 : 1.3 cm. petiolo excluso magna, superne satis viridia, subtus discoloria, laete viridia vel cinerascentia, utrinque indistincte et laxe vel subanguste reticulata (margines cellularum epidermidis utriusque facie aequimagnarum, subtus distinctius, undulatae); folia ramulos novellos fulcientia surculorumque latiora, majora, obovato- vel ovato-elliptica, obtusiora, basi subito in petiolum brevem contracta vel attenuata, distinctius distanter serrata, ad 4.5 : 1.8 vel 4.5 : 2.2 cm. petiolo inclusio magna vel minora elliptica circiter 2.5 : 1.5 cm. magna. Inflorescentiae racemosae vel subumbellato-racemosae, densiflorae, interdum fere ad mediam nudae vel floribus basi incipientibus, pendentes, apice ramulorum versus saepe fasciculato-racemosae, 8- ad circiter 15-florae; pedicelli graciles, (3-)4-6 (infimi ad 8) mm. longae, bracteis anguste lanceolatis, acuminatis ad 2.5 mm. longis vel ovato-lanceolatis acutis breviribus suffulti; flores ?lutei, satis parvi, aperti circiter ad 6 mm. diametentes; sepala externa ovato-lanceolata, parva, ut media late ovata illis fere duplo majora, rubescens, interna obovata vel obovato-oblonga, circiter 5 mm. longa; petala obovato-oblonga, circiter 5.5 mm. longa, apice emarginata, basi breviter unguiculata, glandulis 2 subparvis ovoides aurantiacis separatis praedita; stamina petalis circiter $\frac{1}{3}$ - $\frac{1}{4}$ breviora, apice truncata vel leviter subemarginata; ovarium late ellipticum, stigmate sessili lato, ovulis (1-)2 sessilibus instructum. Fructus obovato-elliptici vel elliptici, ?sanguinei, ?pruinosis, 7-8 : 4-5 mm. magni, estylares; semen 1, dilute purpureo-brunneum, sublaeve, circiter 5 mm. longum.

I believe that I am quite right in assuming that *B. durobrivensis* is a hybrid between *B. canadensis* and *B. Poiretii*. I received several forms of it from the Highland Park at Rochester, N. Y. One, numbered 12, was sent in flower collected on June 8, 1908; fruiting branches were sent September 18, 1906 and September 8, 1916. It was called *B. macracantha*, and had ovate-lanceolate acute bracts like those of *B. canadensis*. The other (no. 19) consisted of fruiting specimens collected September 18, 1906 and October 11, 1916, and named *B. sinensis*, with lanceolate acuminate bracts like those of *B. Poiretii*. The form has nothing to do with either the true *B. macracantha* or *B. chinensis*.

Of *B. canadensis* I want to give a precise description and to add a few words as to its synonymy and history.

Berberis canadensis Miller, Gard. Dict. ed. 8, no. 3 (1768).—Münchhausen, Hausvater, v. 112 (1770).—J. S. Kerner, Darstell. Ausl. Bäume, 2, t. 15 (1796).

Berberis dumetorum, *latissimo folio* Herman, Par. Bot. Prodr. in Simon Warton, Schola Bot. 317 (1689).

Berberis, latissimo folio; canadensis H. R. Par. in Simon Warton, l. c. 289.

dauerhaft; bringt bey uns reifen Saamen." He adds "Miller 2." Burgsdorf, l. c. 33, under no. 93 indicates another form: "*B. humilis*. Der Zwerg-Berberisbeer-Strauch. La petite Épine vinette de Virginie. The American dwarf Barberry. Sommergrün; Erdholz; dauerhaft; bringt bey uns Saamen. Loddiges Cat. (Ist. nicht beschrieben)." This form, too, seems to be *B. canadensis*.

This species probably came to France soon after the first French settlers went in Virginia. They were aware of the value of the fruits for sweets that were highly esteemed at that time in France. In England the species apparently soon disappeared from gardens until 1828 when it was reintroduced according to Sweet (as *B. caroliniana*). At present the true *B. canadensis* is rarely to be seen in European gardens according to Bean's statement and my own observations; the name *B. canadensis* is often used for forms of the *B. emarginata-provincialis* group. *Berberis canadensis* is well characterized by its dark, finely pustulate branches, the somewhat whitish undersurface of its scarcely veined, rather smooth leaves which on vigorous shoots are rather broad or almost roundish with a coarse subundulate dentation, by its rather small pale yellow flowers, and its ellipsoidal fruits of a shining almost lacquered red.

The following forms seem to represent hybrids between *B. canadensis* and the European *B. vulgaris*.

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? *B. crenulata* Schrader, l. c. 362.

B. caroliniana d) *B. declinata* Koch, Dendrol. I. 399 (1869).

Frutex ut videtur squarrosus; ramuli annotini flavescentes vel brunnescentes sed distincte violascentes, satis angulato-sulcati, laeves, vel ut biennes sordide brunnescenti-cinerascentes et nigro-punctati, vetustiores nigrescentes; internodia 1.5-2(-2.5) cm. longa; spinae 3-fidae vel simplices, satis debiles, flavescentes, subtus sulcatae, mediae 8-10 mm. longae (vel inferiores validiores ad 2.5 cm. longae), lateralibus longiores. Folia ad 6-fasciculata, inaequalia, matura crasse papyracea, ramulorum fertilium obovato-oblonga, vel obovato-elliptica, apice obtusa vel breviter acuta, minute mucronulata, basi satis subito in petiolum 2-10(-15) mm. longum contracta, margine indistincte vel minute satis distanter (rarius angustius) serrata vel subintegerima, minimis exceptis 2 : 0.9 ad 2.5 : 1.5 (vel 4.5 : 2) cm. petiolis exceptis magna, superne saturate viridia, subtus discoloria, cinerascentia vel glaucescentia, pruinosa, utraque pagina satis laxe et tenuiter reticulata, (margines cellularum epidermidis utriusque faciei fere aequimagnarum subrectae vel leviter undulatae); folia ramulos juveniles fulcientia majora, obovato- vel elliptico-oblonga, grossius et distantius serrata (serraturis inferioribus ad 2 mm. longis), ad 5 : 2.5 (vel ad 7 : 3.5) cm. magna petiolo ad 1 cm. longo inclusa, surculorum ovato-elliptica vel late elliptica, satis obtusa, distanter

grosse serrata vel subintegerrima, 2.5 : 1.5 ad 5 : 2.5 cm. magna petiolo brevi inclusa, subtus valde glaucescentia, utrinque laxe elevato-reticulata. Inflorescentiae racemosae vel racemoso-umbellatae, pedunculo 1-2 cm. longo nudo saepissime instructae (rarius summae subfasciculato-racemosae), circiter 3-5 cm. vel infimae ad 7 cm. longae; pedicelli partim verticillati, satis graciles, inferiores ad 11, superiores circiter 7-5 mm. longi, bracteis lanceolatis acuminatis 1.5-2 mm. longis suffulti; flores mediocres vel satis parvi, circiter 6-7 mm. diam., lutei, extus rubescentes; sepalum externa minima prophylliformia, media late ovata, internis late obovatis minora, interna obovato-oblonga, circiter 4.5 mm. longa petala obovato-elliptica, circiter 5 mm. longa, apice subtruncata leviter emarginata, basi vix vel satis distincte breviter unguiculata, glandulis 2 oblongis satis magnis aurantiacis separatis praedita; stamna petalis $\frac{1}{3}$ breviora, apice subobtusa; ovarium ellipticum, stigmate satis lato, ovulis 2 subsessilibus. Fructus obovato- vel oblongo-elliptici, ad 9 : 4.5 vel 10 : 5 mm. magni, sanguinei?, vix vel paulo pruinosi; semina 1-2, rubro-brunnea, circiter 5-5.5 mm. longa, levissime punctulata.

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also belongs to *B. declinata*. The following form I wish to describe as a rather distinct variety apparently of the same origin.

× *Berberis declinata* var. *oxyphylla*, n. var.

Frutex habitu ignoso; ramuli annotini satis obscure vel sordide brunnescentes, striato-angulati vel angulato-sulcati, lenticellis minimis punctati, biennes cinerascentes vel cinereo-brunnescentes, vetustiores cinerascentes vel nigrescentes; internodia 1–2 cm. longa; spinae ramulorum juvenilium satis evolutae, flavescentes vel brunnescientes, 3-fidae vel versus apicem simplices, subtus sulcatae, mediae ad 2 cm. longae, lateribus longiores. Folia ad 8-fasciculata, inaequalia, matura crasse papyracea, ramulorum fertilium elliptico-lanceolata, elliptica vel obovato-oblonga, apice acuta vel acutiuscula, basi cuneata satis subito in petiolum 1–6 mm. longum attenuata, margine fere semper densissime graciliter serrulata serraturis 0.2–0.7 mm. longis inaequalibus circiter (4–)5 pro 5 mm., minimis exceptis 2.5 : 1 ad 3.5 : 1.5 vel ad 4 : 2 cm. magna petiolis exclusis, superne saturate viridia, subtus laete viridia vel interdum paulo pruinosa, utrinque (subtus distinctius) satis anguste elevato-reticulata, (margines cellularum epidermidis paginae superioris valde undulatae inferioris minime vel indistincte undulatae); folia ramulos novellos fulcipientia surculorumque similia vel magis lanceolata, acutiora, apice longius mucronulata, basi sensim attenuata, margine satis distincae et interdum sinuato-spinuloso-serrata, dentibus interdum ad 3 mm longis, utrinque 2–6, minora 2 : 0.6, majora ad 4–5 : 1 cm. magna petiolo ad 6 mm. longo inclusa, subtus pruinosa, glaucescentia, utrinque laxius reticulata. Inflorescentiae racemosae, inferne nudae, vel versus apicem ramuli breviter racemosae, 4–5 mm. longae, circiter 8–18-florae, pedicello fructifero 4–7 mm. longo, bractea late lanceolata acuta vel breviter acuminata 1–1.5(–2) mm. longa suffulto; flores ut videtur pallide lutei, extus rubescentes, satis parvi, 5–6 mm. diam.; sepala externa prophyliformia ovato-triangularia, minima, media iis duplo majora elliptico-ovata, interna late obovata vel obovato-elliptica, 4–4.5 mm. longa, apice satis emarginata, basi leviter unguiculata, glandulis 2 satis parvis ovoideis aurantiacis distantibus praedita; stamina petalis $\frac{1}{3}$ breviora, apice vix apiculata; ovarium ovato-ellipticum, stigmate mediocri sessili, ovulis 2 subsessilibus. Fructus sanguinei?, paullo pruinosi, elliptici vel obovato-elliptici, circiter 9 : 4–4.5 mm. magni, estylares; semen 1, purpureum, laeve, circiter 5–5.5 mm. longum.

This form came to the Highland Park at Rochester, N. Y., as *B. actinacantha* from Spaeth's nurseries at Berlin. I received specimens collected on June 8, and October 15, 1907 and October 12, 1916, under no. 25 which is the type of the variety, and no. 23 which is a form slightly more like typical *B. declinata*. The variety is conspicuous by its relatively acute leaves which are very finely and densely serrate on the flowering branches while those of the shoots have a wider and coarser serration and

are distinctly pruinose beneath. The spines are rather stout. The dull brown twigs with minute lenticelles, the short bracts and other features of the flowers strongly point to *B. canadensis*, the other parent being either *B. vulgaris* (or possibly *B. amurensis* var. *japonica* Rehd.). The undulate margins of the cells of the upper epidermis of the leaves are present in both species.

In the Gray Herbarium I have seen a specimen marked apparently by Spach "*B. aetnensis* Rafin." from the Botanic Garden at Paris of which the flowering branch easily might be taken for *B. declinata oxyphylla*. Of the two other sterile branches the narrow obovate leaves show the same fine, almost aristate serration and measure 2 : 1 up to 4 : 2.8 cm. without the petiole which is 5–10 mm. long. The 2–3-year-old branches are dirty grayish-brown, minutely punctate, the spines brownish and up to 12 mm. long. Probably the cross *B. canadensis* with *B. vulgaris* first originated at Paris where *B. canadensis* was in cultivation at a very early time.

The following hybrid forms are often met with in gardens under the name of *B. canadensis* but, in my opinion, have nothing in common with that species.

Berberis laxiflora Schrader in Linnaea, XII. 367 (1838).—Schneider in Mitt. Deutsch. Dendr. Ges. VIII. 177 (1907).

Frutex ad ultra 2 m. altus, ramis virgatis subdeflexis, ramulis declinatis; ramuli annotini griseo-brunnei (vel ex Schrader surculi pallide sanguinei), valde angulato-sulcati, biennes cinerascentes; internodia 1–2.5 cm. longa; spinae simplices vel 3-fidae, brunnescentes vel cinerascentes, subtus sulcatae, mediae 0.7–1.5 cm. longae, lateralibus longiores. Folia ad 8-fasciculata, valde inaequalia, papyracea, ramulorum fertilium obovato-oblonga, apice acutiuscula, mucronulata, basim versus subsensim in petiolum 7–10 mm. longum attenuata, minute vel parce vel subdistincte serrata vel subintegra, minimis exceptis 2 : 0.9–4, 5 : 2, rarius ad 6.5 : 3.2 cm. magna, superne saturate viridia, subtus cinereo-viridia utrinque laxe sed distincte elevato-reticulata, ramulos juveniles fulcescentia majora, cuneiformi-ovata, in petiolum longiore desinentia, grossius serrata, ad 4 : 1.7–7 : 3.5 cm. magna petiolo ad 18 mm. longo excluso, surculorum late ovata vel ovato-elliptica, apice rotundata, basi subito in petiolum circiter 5 mm. longum contracta, grossius distantius saepe subsinuato-serrata, serraturis 0.5–1.5 mm. longis, circiter 3.5–4.5 longa et 2.5–3 cm. lata, subtus distinctius glaucescentia (pruinosa). Inflorescentiae elongato-racemosae, pendentes, 3.5–9 cm. longae, basi vel vix nuda; pedicelli fructiferi infimi ad fere 2 cm., superiores 6–10 mm. longi; bracteae lanceolatae, acuminatae, 1.5 ad fere 3 mm. longae; flores (colore *B. vulgaris*?) circiter 7 mm. diam.; sepala (externa minima prophylliformia et cito caduca?) media late ovata internis late ovato-ellipticis vel obovatilis circiter 5 mm. longis duplo minora; petala circiter

5–5.5 mm. longa, obovata, apice leviter emarginata vel subretusa, basi paullo attenuata, glandulis 2 satis magnis ovoideo-oblongis aurantiacis separatis praedita; stamina normalia ut in *B. vulgaris*; ovarium oblongo-ellipticum, stigmate satis lato sessili, ovulis 2 subsessilibus. Fructus oblongo-elliptici, circiter 10 : 5 mm. magni stigmate sessili excluso, ex cl. Schrader initio pallide sanguinei, deinde saturate sanguinei vel coccinei; semina?

Schrader's type is a very uncertain form supposed to have come from America. I first thought it might be nothing but *B. vulgaris* brought back from America because it has no connection whatever with *B. canadensis*. At present I am inclined to consider *B. laxiflora* a cross between *B. chinensis* and some form of *B. vulgaris*. The long racèmes bear some resemblance to those of *B. amurensis* as I said in 1907 but this species had not yet been introduced at Schrader's time. Later *B. laxiflora* mostly has been taken for *B. vulgaris* but there are so many forms in cultivation under the name *B. laxiflora* that it is impossible to decide which form a certain author may have had in mind. It is not without some hesitation that I propose to keep Schrader's name for what I regard as a cross between *B. chinensis* and *B. vulgaris*. There seem to be in gardens also some rather different forms of this origin which may be distinguished as follows:

Ramuli annotini flavo-cinerei vel cinereo-brunnescentes (non satis brunnescentes vel violascentes).

Folia ramulorum floriferorum anguste obovato-oblonga, circiter 10–20 mm. lata, subobtusa, satis parce vel indistincte serrato-denticulata vel subintegerrima.

var. *typica*.

Folia ramulorum floriferorum oblanceolata, 6–15 mm. lata, acutiora, satis dense breviter serrulata..... var. *oblanceolata*.

Ramuli annotini satis distincte purpureo-brunnei, etiam biennes brunnescenti-cinerascentes; folia ramulorum floriferorum obovato-oblonga vel obovato-elliptica, breviter vel grossius satis distanter serrato-dentata..... var. *Langeana*.

× *Berberis laxiflora* var. *oblanceolata*, var. nov.

Frutex ad ultra 1 m. altus, habitu ut videtur *B. chinensis* ramis elongatis, ramulis plus minusve dependentibus; ramuli annotini flavo-cinerei vel cinereo-brunnescentes, sulcato-angulati, biennes cinerascentes; internodia 1.5–2.5 cm. longa; spinae satis debiles, simplices vel inferiores 3-fidae (surculorum non visae), leviter brunnescentes, subtus vix vel paullo sulcatae, mediae ad 8 mm. longae. Folia ad 8-fasciculata, matura papyracea, ramulorum fertilium oblanceolata, apice acuta vel subacuta, basi sensim in petiolum vix ad 5 mm. longum attenuata, margine distincte serrulata dentibus utrinque 8–15 minimis vel ad 0.75 mm. longis, 2–4 cm. longa et 0.6–1.3 cm. lata, superne viridia, subtus paullo discoloria, (vel subcinerascentia?), utraque facie satis anguste vel superne laxius reticulata (margines cellularum epidermidis utrinque aequimagnarum distincte undulatae); ea ramulos juveniles fulcientia vel surculorum ut videtur majoribus simillima (vel in formis similibus folia surculorum latiora), elliptica, vel ovato-elliptica, obtusiora, minus dense vel vix serrata, basi subito in petiolum brevem contracta, 3–5 cm. longa et 1.3–2 cm. lata. Inflore-

scentiae racemosae, ad 5.5 (vel 7) cm. longae, pedunculo nudo 1–2 cm. longo incluso, satis laxiflorae, cum ramulis pendentes; pedicelli graciles, infimi ad 10, superiores 5–7 mm. longi, bracteis anguste lanceolatis acuminatis circiter 2 mm. longis suffulti; flores lutei (?), aperti circiter 7 mm. diametentes (?); sepala externa prophylliformia ovato-lanceolata, media ovato-elliptica vel elliptico-oblonga illis fere duplo majora, interna obovata vel obovato-oblonga, satis angusta, 3.5–4 mm. longa; petala obovato-elliptica, 4–4.5 mm. longa, apice breviter inciso-emarginata, basi vix vel distinctius subunguiculata, glandulis 2 aureis oblongis separatis mediocribus praedita; stamna petalis $\frac{1}{3}$ breviora, apice truncata; ovarium elliptico-oblongum, stigmate satis crasso sessili, ovlis 2 sessilibus. Fructus elliptico-oblongi, ad 11 : 4–5 mm. magni, ut videtur pallide vel atro-sanguinei, interdum paullo pruinosis; semen 1, ad 7 mm. longum, atropurpureum, minutissime punctulatum.

This variety comes very near the typical *B. laxiflora* but looks rather different at first sight with its mostly much narrower leaves which have a richer and closer serration. Apart from this serration and the yellow-grayish color of the young twigs one might take it for *B. chinensis*. As the type I regard specimens from the Harvard Botanical Garden collected on May 27, 1880 (flowers) and October, 1879 (fruits), and preserved in the Herbarium of the Arnold Arboretum. Plants cultivated in that Arboretum in 1903, of which flowers have been collected by Rehder on May 22, agree well with the type. A plant from the Kew Arboretum, collected in October, 1906 (as *B. sinensis* no. 2), seems also to belong to this variety.

× *B. laxiflora* var. *Langeana*, var. nov.

Frutex erectus, ut videtur habitu *B. vulgaris*, ramis satis crassis, ramulis ut videtur pendentibus, ad ultra 1.5 m. altus; ramuli annotini distincte purpureo-brunnescentes, sulcato-angulati, etiam biennes brunnescenti-cinerei, deinde cinerascentes vel vetustiores nigrescentes, internodia 1.5–3 cm. longa; spinae summis exceptis satis validae, simplices vel 3-fidae, brunnescentes vel flavo-brunnescentes, subtus sulcatae, mediae 1–3.5 cm. longae, latioribus angulo recto patentibus vix longiores. Folia ad 8-fasciculata, valde inaequalia, matura crasse papyracea, ramulorum fertilium obovato-oblonga vel obovato-elliptica, apice satis obtusa, basi cuneato satis subito in petiolum 3–12 mm. longum attenuata, margine integra vel parce et subtiliter serrata, rarius (majora inferiora) distincte et satis anguste serrulata, minimis exceptis 2–6 cm. petiolo inclusa longa et 0.8–2.5 cm. lata, superne intense viridia, subtus pallidiora, leviter glaucescentia, pruinosa, utrinque paullo laxius quam in *B. vulgaris* reticulata (margines cellularum epidermidis paginae superioris subrectae, inferioris paullo undulatae); ea ramulos novellos fulcientia majoribus alteris similia vel majora et distinctius serrato-dentata, surculorum ovato-elliptica, acutiora, subito in petiolum brevem contracta, pleraque distincte

serrulata, serraturis ad 1.5 mm. longis circiter 4–5 pro 1 cm., ad 5.5 : 2.5 cm. magna, subtus distinctius glaucescentia. Inflorescentiae racemosae vel versus apicem ramulorum fasciculato-racemosae, 2.5–4 cm. longae; pedicelli inferiores ad 12 mm., superiores 5–7 mm. longi, bracteis lanceolatis acuminatis 2–3 mm. longis suffulti; flores ut videtur lutei, interdum extus rubescentes, aperti circiter 7–8 mm. diametentes; sepala externa prophyl-liformia lanceolata, minima, cito decidua, media elliptica vel late ovata, internis obovatis vel obovato-ellipticis 4.5–6.5 mm. longis $\frac{1}{3}$ vel duplo minora; petala obovato-oblonga 5–6.5 mm. longa, apice leviter vel vix emarginata, basi vix vel distinctius contracta, glandulis 2 irregulariter oblongis aurantiacis separatis satis magnis praedita; stamna petalis $\frac{1}{3}$ breviora, apice subtruncata, ovarium ovato- vel elliptico-oblongum, stigmate satis lato, ovulis 2 fere sessilibus. Fructus ? sanguinei, partim pruinosi, elliptici vel ovato-elliptici, 9–10 : 4–5 mm. magni stigmate sessili excluso; semen 1, circiter 6–7 mm. longum, rubro-brunneum, minutissime punctulatum.

This form I received as *B. serotina* from the Botanic Garden at Copenhagen in flowering and fruiting specimens collected in June and October of 1916 (no. 4814/27). The type had been raised from seeds of *B. serotina* J. Lange in memory of whom I name it. Quite identical with the type is another form from the same garden collected at the same time and raised from seeds of *B. Guimpelii* (no. 4814/21). Both show the influence of *B. vulgaris* in their large leaves, the color of the branchlets and in their strong spines. They differ from the typical *B. laxiflora* in the more robust thorns, the distinctly brown-red young twigs, and the shorter inflorescence; from var. *oblanceolata* they may be distinguished by their wider, much less dentate or almost entire leaves and by the color of the twigs. In its habit, var. *Langeana* is probably more like *B. vulgaris* while var. *oblanceolata* resembles more *B. chinensis*. A specimen from Kew, collected October, 1916 (no. 14, received under no. 59–03 from Berlin as *B. Guimpeli*) seems to belong to var. *Langeana* or typical *laxiflora*. A synonym of it may be *B. sulcata* Koch et Bouché (in Ind. Sem. Hort. Berol. 1854, App. Gen. Spec. nov. p. 12), so far as can be judged from the description only.

To understand clearly this hybrid and other critical forms found in gardens one should be well acquainted with the true *B. chinensis* of which I will add the following description and remarks.

***Berberis chinensis* Poiret in Lamarck, Encycl. VIII. 617 (1808).**

B. sinensis Desfontaines, Tabl. École Bot. 150 (1804), nom. nud.; ed. 2, 175 (1815), nom. nud.; Hist. Arb. Arbriss. II. 27 (1809), cum descr. manca.—Loiseleur-Desglaize, Herb. Gen. Amat. VII. 487, tab. col. (1824), excl. synon. pro parte.—Watson, Dendrol. Brit. I. tab. 26 (1825).—Hooker in Bot. Mag. CVII. t. 6573 (1881).—Schneider in Mitt. Deutsch. Dendr. Ges. XV. 179 (1907).

B. vulgaris var. ? *iberica* Steven et Fischer in litt. ex De Candolle Syst. Nat. II. 6 (1821).

B. iberica Sweet, Hort. Brit. 13 (1826).—Schneider in Bull. Herb. Boiss. V. 656 (1905).

- B. canadensis* Guimpel, Otto et Hayne, Abb. Fremd. Holzart. I. 79, t. 63 (1819-1825), non Miller.
B. spathulata Schrader in Linnaea, XII. 376 (1838).—Schneider in Mitt. Deutsch. Dendr. Ges. XV. 179 (1907).
? *B. laxa* Rafinesque, Sylva Tellur. 68 (1838).
B. (vulgaris) spathulata Gordon in Gard. Mag. n. s. VI. (xvi.) 2 (1840).
B. aristata var. *sinensis* Koch, Hort. Dendr. 18 (1853).
B. Guimpeli Koch et Bouché, Ind. Pl. Hort. Berol. 1854, App. 13.
B. intermedia Koch, Dendrol. I. 404 (1869).
B. serotina Lange, Ind. Sem. Hort. Bot. Haun. 1872, adnot. p. 5; in Bot. Tidskr. ser. 3, II. 138, t. 4 (1879).

Frutex erectus, dense elongato-ramosus, circiter 1.5-2, interdum ad 3 m. altus, ramis apice deflexis vel nutantibus, stolonibus subterraneis; ramuli annotini rubro-brunnei, purpurascentes vel fusco-purpurei, saepe nitidi, distincte sulcato-angulati, biennes similes vel ut vetustiores cinerascentes; internodia 1.5-2 cm. longa; spinae ramulorum fertilium simplices vel 3-fidae, interdum valde reductae, flavo-brunneae vel purpurascentes, mediae 0.5-1.8 cm. longae, subtus planae vel sulcatae, surculorum nondum visae. Folia ad 8-fasciculata, inaequalia, matura papyracea sed firma, ramulorum fertilium oblanceolata, spathulata, obovato-lanceolata, anguste ovali-oblonga vel elliptico-oblonga, apice acuta vel subobtusa, mucronulata, basim versus sensim in petiolum 1-8 mm. longum attenuata, margine integerrima vel utrinque dentibus 1-5 serrulato-dentata, 1.6-4 cm. longa et 0.5-1 vel 1.3 cm. lata, superne laete viridia, nitentia, subtus pallide viridia, utraque pagina (*in vivo* minus distincte) laxe elevato-reticulata, (margines cellularum epidermidis utriusque faciei fere aequi-magnarum superne rectae vel vix undulatae subtus pleraeque levissime undulatae); folia ramulos novellos fulcientia surculorumque aliis similia vel satis late elliptica, ad 4.5 cm. petiolo ad 1 cm. longo excluso longa et ad 1.8 vel 2 cm. lata, saepius serrulata dentibus utrinque ad 12 subpatentibus. Inflorescentiae racemosae (apice ramulorum interdum abbreviatae depauperatae) breviter pedunculatae vel saepius pedunculo nudo interdum ad 3 cm. longo instructae, ad 7 cm. longae, 10-20-florae; pedicelli interdum ex parte verticillati, graciles, fructiferi (6-)7-15 mm. longi, saepe rubescentes, bracteis lanceolatis acuminatis 2-4 mm. longis suffulti; flores mediocres, 6-8 mm. diametentes, citrini vel lutei; sepala externa prophyl-liformia anguste vel late triangularia, saepe rubescens, sepalis mediis ovatis vel late ovato-ellipticis obtusis circiter 3-3.5 mm. longis sub duplo minora, interna late obovata, 4-5.5 mm. longa; petala 4-5 m. longa, obovato-oblonga, apice emarginata, basi pleraque breviter unguiculata, glandulis 2 oblongis aurantiacis separatis praedita; stamina petalis $\frac{1}{3}$ breviora, apice truncata vel levissime repando-apiculata, ovarium anguste ellipticum, stigmate lato brevi, ovulis 1-2 sessilibus instructum. Fructus elliptici vel anguste elliptici, 9-10(-11) : 4-5 mm. magni, maturi cerasini vel atropurpurei, partim pruinosi; semen plerumque 1 (interdum 2), initio ut videtur flavo-brunneum, deinde brunneo-purpureum, minutissime corrugatum.

This species has been in cultivation for a long time. It was first mentioned by Desfontaines in 1804 without a description as *B. sinensis* from the Jardin des Plantes. Poiret described it first in 1808 as *B. chinensis*. The form described by Poiret seems to be the same as that figured by Loiseleur-Deslongschamps in 1824; Hooker's plate, too, agrees well with it, but the flowers are painted rather pale and pure yellow while the color is deep-yellow with reddish outer sepals on Loiseleur's plate. Spach (Hist. Vég. VIII. 42 [1839]) says: "Fleurs d'un jaune vif. Sepals souvent lavés de rouge en dessous." He also well describes the variability of the inflorescence, saying: "Grappes longues de 1 pouce à 4 pouces, tantôt sessiles ou soussessiles, tantôt plus ou moins longuement pedonculées, assez lâches, ou rarement un peu denses. . . ." As to the color and size of the fruits the statements differ somewhat; Poiret says: "Les fruits sont des baies d'un rouge un peu jaunâtre, ovales, obtuses, un peu rétrécies à leur base, légèrement ombiliquées à leur sommet, plus petit que celles du *berberis vulgaris*." Loiseleur states: "Le fruit est une baie ovale rouge, d'un rouge foncé. . . ." Spach describes the berries "d'un pourpre plus ou moins foncé, du volume de celles du *Berberis commun*." Schrader who had before him the true plant says that the berries are "cerasinae," which is a true description of the color according to my own observations. One might also say atrosanguineae or plume-red. The color of the fruits is, however, somewhat different according to its condition of ripeness.

As to the different synonyms mentioned above the following is to be said. On the plate of Guimpel the petals are entire, and Koch et Bouché (l. c.) also describe the petals of *B. Guimpelii* as "rotundata integrerrima." Of its relationship the authors say: "*B. sinensis* Desf. frutice elatiore ramis erectis sulcatis et racemis erectis discrepat. Nostrae proxima est *B. spathulata* Schr. (*B. canadensis* Tausch) quae habitu elatiore distinguitur." In his Dendrology Koch, however, says that the flowers are "langgestielt bisweilen zu 2 und 3 an einem verlängerten, allgemeinen Stiel eine überhängende Traube bildend" a very different statement from "racemis erectis." Of Schrader's *B. spathulata* I already pointed out in 1907 that it is nothing else than *B. chinensis*. Schrader describes the branchlets as "ferrugineo-castanei," they become grayish very soon. The only peculiar feature of *B. Guimpelii* would be the entire petals but I suppose that is a wrong statement or that that condition occurs only occasionally. The specimens distributed by Koehne (Herb. Dendr. no. 217) who certainly was well acquainted with Koch's plant has distinctly emarginate petals. His specimen with "racemis insolito abbreviatis, qui in stirpibus junioribus saepe occurrere videntur" is a good proof of the variability of the inflorescences of which the lowermost pedicels sometimes are almost subpaniculate as it is well indicated on Guimpel's plate. In the Herbarium of Copenhagen I found a plant of which the inflorescences were rather distinctly paniculate in their lower part, but otherwise I could not detect any hybrid influence of another species. Unfortunately the origin of this plant is not known.

After all I cannot regard *B. Guimpeli* and *B. spathulata* as different from typical *B. chinensis*. *Berberis serotina* of Lange, too, of which I have had the type before me, agrees well enough with it. On Lange's plate the styles of the fruits are too long, and other characters of the flowers, too, are not correctly represented. Some specimens, however, collected at the Forsthavet at Charlottenlund on September 29, 1867, have a very short style while it is wanting entirely on specimens collected in 1874. These forms with a very short style resemble certain forms of *B. crataegina* which have been very imperfectly known.

As to the native country of *B. chinensis* we are now sure that it is not identical with any species from China or eastern Asia, and that it cannot be separated from what I called *B. iberica* in 1905. I do not know the precise locality where the type of *B. iberica* was found; the indication "Caucasus" being a rather uncertain statement. Already Lindley (in Penny Cycl. iv. 261 [1835]) stated that *B. iberica* "mostly resembles" *B. sinensis*, his *B. sinensis* being *B. Poiretii*. Rightly he identifies Watson's plant of the Dendrol. Brit. with *B. iberica*, and Hooker f. in 1881 (l. c.) says that "a Caucasian plant received from St. Petersburg, and bearing this name, resembles it entirely in foliage, but the flowers are more umbellate towards the end of the raceme." It seems that it was first introduced to Paris, in Hort. Lemmonier, as De Candolle states in 1821. Tournefort may have brought it from Asia Minor as early as 1702. The type of *B. sinensis* var. *paphlagonica* Schneider was collected by Sintenis (no. 3446) in the Wilajet Kastambuli. As I have not seen the specimens mentioned by Boissier et Buhse (Aufz. Reise Transkauk. Pers. Ges. Pflanz. 8 [1860]) from northern Persia and referred to *B. vulgaris iberica*.

The next hybrid Berberis I wish to deal with in this note is a cross between the well known Japanese *B. Thunbergii* and *B. vulgaris*. It seems best to give first a good description of *B. Thunbergii*, and an enumeration of its garden forms.

Berberis Thunbergii De Candolle, Syst. Nat. II. 9 (1821); Prodr. I. 106 (1824).—Hooker f., Bot. Mag. cviii. t. 6646 (1882).—Keisuke Ito, Fig. Desc. Pl. in Kois. Bot. Gard. II. ed. Matsumura, t. IV, c. textu (1883).—André in Rev. Hort. 1894, 173, f. 66.—Sargent in Gard. & For. II. 52, f. 90 (1889).—Mouillefert, Traité Arb. I. 157, t. 3 (1891).—Saint-Paul in Mitt. Deutsch. Dendr. Ges. VIII. 1, tab. col. (1899).—Kawai in Bull. Coll. Agr. Tokyo, IV. 109, t. 9, fig. 18 (1900).—Shirasawa, Icon. Ess. For. Jap. II. t. 17, figs. 18–31 (1908).—Silva Tarouca & Schneider, Uns. Freiland-Laubg. ed. 2, 115, fig. 112 (1922).

B. cretica Thunberg, Fl. Jap. 146 (1784), non Linné.

B. Thunbergiana Schultes, Syst. Veg. VII. pt. 1, 6 (1829).

B. sinensis Koch in Ann. Mus. Lugd.-Bat. Bot. I. 252 (1864), excl. synon., non Desfontaines.

B. chinensis Franchet et Savatier, Enum. Pl. Jap. I. 22 (1875), non Poiret.

B. sinensis var. *angustifolia* Matsumura, Ind. Pl. Jap. pt. 2, 128 (1912), pro parte, non Regel.

Frutex latus, dense breviter ramosus, ad 1.5–2.5 m. altus; ramuli annotini fulvi, vivide rubescentes vel purpureo-rubri, biennes purpurei, glabri, valde angulato-sulcati, vetustiores nigrescentes vel cinerascentes; internodia 0.5–1 cm. longa; spinae pleraeque simplices, rarius 3-fidae, subtus haud vel vix sulcatae, 0.5–1.8 cm. longae, flavae, purpurascentes vel cinerascentes. Folia ad 8-fasciculata, valde inaequalia, matura crasse membranacea, ramulorum fertilium obovato-spathulata vel -oblonga, apice obtusa vel rotundata, rarius breviter acuta, mucronulata, basi satis subito vel sensim in petiolum 2–10 mm. longum contracta, 0.5–2 cm. petiolo excluso longa, 0.2–1.6 mm. lata, superne intense viridia, costa tenuiter incisa, nervis lateralibus paullo vel vix visibilibus, subtus pallide viridia vel albescens, pruinosa et interdum sub microscopio papillosa (margines cellularum epidermidis utriusque faciei subaequimagnarum in pagina superiori rectae vel leviter undulatae, in pagina inferiori fere semper valde irregulariter undulatae); folia ramulos novelllos fulcientia surculorumque aliis similia vel majora, ad 3.5 cm. petiolo excluso longa et ad 2 cm. lata, obovata vel elliptico-rhomboidea, petiolis 0.3–1 cm. longis. Inflorescentiae 1–5-florae, fasciculatae vel umbellato-subracemosae et breviter pedunculatae; pedicelli (5–)6–10 mm. longi, graciles, bracteis triangulari-lanceolatis acuminatis 1.5–2 mm. longis suffulti; flores flavi, extus rubescentes, 7–10 mm. diametientes; sepala externa prophylliformia parva triangularia vel ovata, media oblonga obtusa internis late obovatis vel ellipticis obtusis 5–6 mm. longis fere duplo minora; petala obovata vel obovato-oblonga, apice truncato-rotundata, leviter emarginata vel crenulata, basi paulo contracta, 6–6.5 mm. longa, glandulis 2 distinctis satis brevibus ovoideis aurantiacis praedita; stamna petalis $\frac{1}{3}$ breviora, apice obtusa vel fere leviter emarginata; ovarium satis crasse ellipticum, stigmate lato sessili, ovulis (1–)2, rarissime 3 sessilibus instructum. Fructus elliptici, circiter 10 mm. longi et 5–6 mm. crassi, rarius majores ad 12–13 : 7–8 mm. magni, corallini vel vivide purpurei, tarde decidui; semina 1–2, elliptico-oblonga, laevia, initio flavo-brunnea, deinde purpurescentia, (7–)8 mm. longa.

Berberis Thunbergii is a common plant in the central and southern parts of Japan, but apparently is not found in northern Hondo or in Hokkaido. De Candolle based the species on the type of Thunberg's *B. cretica*. It was introduced into cultivation by Maximowicz about 1865 Regel (in Gartenfl. xxii. 238 [1872]) states that the type and f. *Maximowiczii* were hardy at Petersburg. In Del. Sem. Hort. Petrop. it appears first in 1875, p. 23. The Arnold Arboretum received it from St. Petersburg in 1875 (no. 82). It came to Kew from Booth in 1874 (MSS. Cat. 1884, p. 9), and it was at Segrez in 1877. It is one of the best marked species by its dense habit, the deeply furrowed branches, the small spatulate entire leaves, the pale yellow flowers, and the shining red rather dry fruits that remain long on the shrubs. The autumnal color of the leaves is splendid. The following forms and varieties can be distinguished:

Berberis Thunbergii f. Maximowiczii, nov. f.

B. Maximowiczii Regel in *Gartenfl.* xxi. 238 (1872).

B. Thunbergii var. *Maximowiczii* Regel in *Act. Hort. Bot. Petrop.* ii. 420 (1873).—Franchet et Savatier, *Enum. Pl. Jap.* ii. 272 (1879).

A typo recedit foliis acutis vel rarius obtusis utrinque viridibus.—These characters are rather inconstant, and it is almost impossible to distinguish this form with certainty. In the Arnold Arboretum a plant (no. 4769) raised in 1901 from seeds from the Tokyo Botanic Garden seems best to represent this form.

Berberis Thunbergii f. argenteo-marginata, nov. f.

B. Thunbergii, "Silver Beauty," in *Gard. Chron. ser. 3, XLIX.* 10, fig. 10 (1911).

A typo recedit foliis margine argenteo-marginatis.—It originated in the Continental Nurseries of J. van Leeuwen at Franklin, Mass.

Occasionally seedless forms can be found which might be named *f. asperma* with the same right as a *f. enuclea* is distinguished in *B. vulgaris*.

Berberis Thunbergii var. minor Rehder in Mitt. Deutsch. Dendr. Ges. XIII. 330 (1898).

B. Thunbergii var. *Dawsonii*, Bean, *Trees & Shrubs Brit. Isles*, i. 250 (1914).

A typo recedit habitu minore debiliore, foliis plerisque minoribus, floribus saepissime singulis et etiam fructibus saepe minoribus.—It is a form of very dense habit scarcely distinguishable from the type in the herbarium. I refer to it no. 4381 from the Arnold Arboretum which is said to have been raised from seeds of typical *B. Thunbergii*.

Berberis Thunbergii var. pluriflora Koehne ex Rehder in Mitt. Deutsch. Dendr. Ges. XIII. 33 (1898).

A typo praecipue recedit habitu minus dense ramoso, foliis saepe oblongioribus et longioribus majoribus ramulorum sterilium interdum ex parte graciliter serrulatis, inflorescentiis distincte racemosis ad 5.5 cm. longis 5–15-floris.

This form is known only in cultivated state. It is often regarded as a form of the hybrid *B. ottawensis* but plants like those cultivated at the Arboretum under no. 671 (partim) and no. 4576 show no influence of *B. vulgaris* at all. Extremely fine fruiting branches were collected by Sadler in Hort. Kohanke, Painville, Ohio, in October, 1916. The fruits are mostly coral-red as in the type, but there are a few dull red ones with a slight bloom that somewhat suggests *B. vulgaris*. If this variety should be of hybrid origin, too, it certainly represents a form of *B. ottawensis* that comes very near *B. Thunbergii*.

× *Berberis ottawensis* Schneider in *Silva Tarouca & Schneider, Uns. Freiland-Laubg.* ed. 2, 116 (1922), nomen seminudum.

Frutex patulo-rectus, habitu inter *B. vulgaris* et *B. Thunbergii* satis intermedia, circiter 0.6 ad 1.5 m. altus; ramuli annotini plus minusve brunnescentes vel flavo-brunnei, ut biennes flavo-cinerei sulcati, vetustio-

res cinerascentes; internodia 0.8 ad 1.5 cm. (vel surculorum ad 3.5) longa; spinae etiam surculorum satis debiles, parte superiore ramulorum simplices, parte inferiore pleraeque 3-fidae, flavo-brunneae vel flavescentes, mediae 3–8(–10), laterales vix ultra 5 mm. longae, subtus applanatae vel tenuiter sulcatae. Folia 2–6-fasciculata, valde inaequalia, matura membranacea, ramulorum fertilum oblanceolata, obovato-oblonga, subrhomboideo-obovato-oblonga vel obovato-elliptica, apice subacuta, obtusa vel subrotundata, tenuissime mucronulata, basim versus satis subito in petiolum 1–6 mm. longum attenuata, margine integerrima vel dentibus minimis paucis rarius pluribus vix ad 1 mm. longis instructa, angustiora petiolo inclusa 15 : 6 ad 35 : 15 mm., latiora 20 : 11 ad 30 : 15 mm. magna, superne viridia, subtus pallidiora vel subpruinosa, satis laevia vel tenuiter reticulata; folia ramulorum sterilium surculorumque majora, saepissime latiora, ovato-, obovato- vel elliptico-oblonga, apice obtusa vel rotunda, basi acuta et subito in petiolum 1–6(–8) mm. longum contracta, margine satis distanter vel pleraque densius graciliter serrata serraturis vix ad 1 mm. longis, rarius subintegra. Inflorescentiae subumbellato-racemosae vel racemosae, 3- ad 15-florae, rariter (saltem versus apicem ramulorum) ut in *B. Thunbergii* uniflorae, pedicello nudo ad 2 cm. longo, excluso 1–3 cm. longae, patentes vel saepissime nutantes; pedicelli 4–6 mm. longi, apice leviter incrassati, bracteis lanceolatis acuminatis 1.5 ad 2 mm. longis suffulti; flores lutei (sepalis externis vel prophyllis saepe rubescensibus), 6–7 mm. diametentes, sepala externa vel prophylla bracteiformia, media ovato- vel obovato-oblonga 3–4 mm. longa quam petala pallidiora; petala ovato-elliptica vel obovato-oblonga, apice integra, 4–5 mm. longa, basi glandulis satis aurantiacis distinctis praedita; stamena petalis $\frac{1}{4}$ breviora, apice truncata; ovaria elliptico-oblonga, ovulis 2 sessilibus. Fructus (no. 3 ex Ottawa) circiter 9 mm. longi et 5 mm. crassi, ellipsoidei, fere ut in *B. Thunbergii* colorati, stigmate sessili coronati; semen plerumque 1, circiter 6 mm. longum, purpureo-brunneum, minutissime punctulatum.

This hybrid has been observed in different gardens. It has been raised artificially by Dr. Charles Saunders in the gardens of the Experimental Station at Ottawa, Canada, from which Dr. Macoun sent me material of different forms of this cross under numbers 1 to 11 in June, 1917. In this case one of the parents has been *B. vulgaris* f. *atropurpurea*. The first mention of a possible hybrid between *B. Thunbergii* and *B. vulgaris* I find in a note from Professor Jack in Garden and Forest, II. 272 (1889). This note runs as follows: "A curious and beautiful Barberry now in flower here is not referable to any described species, while some of its characters suggest a possible hybrid between *B. vulgaris* and *B. Thunbergii*. It has the bark upon the branches of *B. vulgaris*, the simple, slender spines of *B. Thunbergii*, the tufted, entire obovate leaves of this last species. They are considerably larger, however, paler green, more membranaceous, and borne on long slender petioles. The flowers are produced in long-stalked (sometimes nearly an inch long), umbellate racemes, of eight or ten or sometimes

only of three or four flowers. They are larger than those of *B. Thunbergii*, bright yellow (those of *B. Thunbergii* are much paler), with rounded sepals and petals, and the red-marked filaments of the Japanese plant. They open a week or ten days later than those of *B. vulgaris*, and possess a trace merely of the delightful fragrance of those of this species. The fruit resembles very closely that of *B. Thunbergii*, and hangs, as it is the case with that plant, bright and fresh upon the branches throughout the winter and early spring. Several years ago, Max Leichtlin sent to the Arboretum seeds of 'two red-fruited' Barberries, without any indication of their origin. A large proportion of the seedlings raised from this seed proved to be *B. Thunbergii*, but among them were several individuals of this peculiar plant, which suggests in its umbellate inflorescence some of the forms of the sub-evergreen of *B. aristata* of the Himalayas. But whether, as I suspect, it is a hybrid, or some species unknown here, it is an exceedingly ornamental and valuable garden plant; one of the neatest of the whole genus in its habit of growth, perfectly hardy, and very beautiful when its graceful branches are covered with its nodding umbels of large, bright-colored flowers." This is an excellent description of our hybrid. I have seen several specimens in the Arnold Arboretum under no. 671 and 671-2. There are apparently at least two or three distinct forms of this hybrid. One has the leaves partly tinged with purple according to the fact already mentioned that f. *atropurpurea* of *vulgaris* was one of the parents. Whether var. *pluriflora* of *B. Thunbergii* has to be regarded as a form of the hybrid, too, or a mere variety of *Thunbergii* remains to be seen. There are certainly forms which very closely approach either the one or the other of the parent very closely.

I will add an enumeration and description of *Berberis vulgaris* and its forms.

Berberis vulgaris Linnaeus, Spec. 1. 330 (1753).—J. S. Kerner, Beschreib. Abb. Bäume Sträucher, 84, t. 32 (1787).—Reitter et Abel, Abb. Deutsch. Holzart. 20, t. 49 (1790).—Sowerby, Engl. Bot. 1. t. 49 (1790).—Schkuhr, Bot. Handb. 1. 306, t. 99 (1791).—Vahl, Fl. Dan. vi. 3, t. 904 (1792).—Palmstruch et Venus, Svensk Bot. 1. t. 24 (1802).—Hayne, Darst. Arzeneigew. 1. 41, t. 41 (1805).—Schrink, Fl. Monac. 1. t. 78 (1811).—Bigelow, Fl. Boston, 78 (1914).—Nees v. Esenbeck, Pl. Med. II. t. 368 (1828).—Poiteau & Turpin in Duhamel Traité Arb. Fruit., n. ed. III. 51 t. 51 (1835).—Baxter, British Phaen. Bot. II. t. 115 (1835).—D. Dietrich, Forstfl. ed. 2, 81, t. c. (1838).—Reichenbach, Ic. Fl. Germ. Helv. III. 3, t. 18, fig. 4486 (1838).—Audubon, Birds Am. III. 87, t. 166 (1841).—A. Dietrich, Fl. Reg. Boruss. x. t. 685 (1842).—Seringe, Fl. Jard. III. 257, t. 4, figs. 1-13 (1849).—Sturm, Deutschl. Fl. Abt. I. Bd. xx. t. 9312 (1849).—Böck, Naturg. Abb. Deutschl. wilde Holzart. 46, t. 60 (1859).—Sowerby, Engl. Bot. ed. 3, 1. 71, t. 51 (1863).—Baillon, Hist. Pl. III. 50, figs. 49-55 (1872).—Hallier, Deutschl. Fl. ed. 9, 104, t. 25

(1873/5).—Lange, Arb. Scand. III. t. 102 (1883).—Thomé, Fl. Deutschl. II. 96, t. 299 (1887).—Millspaugh, Am. Med. Pl. I. 15, t. 15 (1887).—Perrin and Boulger, Brit. Fl. Pl. II. t. 83 (1914).

B. vulgaris, sive *Crespinus Camerarius*, De Pl. Epit. Util. P. A. Matthioli 86, c. icone (1536).

B. maximo fructu Gerard, Catal. Arb. 4 (1599).

Berberis Gesner, Hort. Germ. in Cordus, Annot. Pedac. Discor. Libr. 250 (1561).—M. Hoffmann, Fl. Altdorf. Del. Sylv. [11] (1662).—Haller, Enum. Pl. Hort. Gott. 171 (1753).

B. vulgaris Belon, De Negl. Stirp. Cult. 41, lin. 12 (1589).—Clusius, Rar. Pl. Hist. 120, c. icone (1601).

Spina acida, sive *oxyacantha* Dodonaeus, Stirp. Hist. Pemptad. 750, c. icone (1616).

B. officinarum Dalechamps, Hist. Gen. Pl. 137, c. icone (1587).

B. dumetorum C. Bauhin, Pinax 454 (1623).

B. fructu rubro Bobart, Cat. Pl. Hort. Med. Oxon. 9 (1648).

Berberis P. G. 561 *spina acida*, sive *oxyacantha* Stephens & Brown, Cat. Hort. Bot. Oxon. 29 (1658).

B. oxyacantha Cat. Pl. Schol. Bot. Hort. Reg. Paris, 54 (1660).

B. s. oxyacantha Galeni M. T. Titius, Cat. Pl. Hort. Elect. Regiom. (1654), ex Linn. x. 375 (1836).

B. vulgo quae & oxyacantha putata P. Magnol., Hort. Reg. Monspeliensis 22 (1697).

Oxyacantha Galeni etc. (*Berberis officinarum* in indice) Besler, Hort. Eystet. 9, t. 9, f. III (1713).

B. spinis triplicibus Linnaeus, Hort. Cliff. 122 (1737); Fl. Suec. 104. No. 290 (1745).

B. pedunculis racemosis Linnaeus, Mat. Med. 57. No. 170 (1749).—Miller, Gard. Dict. ed. 7, No. 1 (1764).

B. dumetorum Miller, Fig. Pl. I. 42, t. 63 (1760).—Gouan, Fl. Monspel. 312 (1765).—Duhamel, Traité Arb. I. 97, t. 38 (1755); Traité Arb. Fruit. I. 149, t. 152 (1768).—Dict. Pl. Us. Arb. III. 251, t. c. 3 (vel 264) (1793).

B. racemifera, foliis ciliatis Haller, Hist. Stirp. Helv. 360 (1768).

B. officinarum Gleditsch, Pflanzenverz. 57 (1773).

B. vulgaris rubra Aiton, Hort. Kew. I. 479 (1789).

B. acida Gilibert, Exerc. Phyt. I. 284 (1792).

B. irritabilis Salisbury, Prodri. 213 (1796).

B. racemosa rubra Stokes, Bot. Mat. Med. II. 296 (1812).

B. articulata Loiseleur-Deslongchamps in Dict. Sci. Nat. LVIII. 218 (1829), descr. plant. juven.

B. serrulata Rafinesque, Silva Tellur. 68 (1838).

B. vulgaris heterophylla Wierzbicki in Reichenbach, Icon. Fl. Germ. III. 3, t. 18, f. 4486 partim (1838), sec. specim. orig.

B. vulgaris var. *obovato-oblonga* Schrader in Linnaea, XII. 366 (1838).

B. vulgaris arborescens Koch, Hort. Dendr. 17 (1853).

B. vulgaris n. *B. microphylla* Koch in Wochenschr. Ver. Bef. Gartenb. Preuss. IV. 75 (1861).

B. vulgaris p. *B. vulgaris oblongata* Koch, l. c. 76.

B. vulgaris q. *B. arborescens* Koch, l. c. 76.

B. speciosa Hort. ex Koch, l. c. 76 (1861), pro synon.

B. vulgaris var. *arborescens* Jaeger, Ziergeh. 127 (1864).

B. vulgaris var. *serotina* Jaeger, l. c., non Schrader.

B. vulgaris var. *speciosa* Jaeger, l. c.

B. arborescens Hort. ex Koch, Dendr. I. 393 (1869), pro synon.

B. vulgaris normalis a. *typica* Regel in Act. Hort. Bot. Petrop. II. 411 (1873), exclud. synon. pro parte.

B. vulgaris a. *normalis* Dippel, Handb. Laubholzk. III. 114 (1893), exclud. syn.

B. vulgaris d. *canadensis* Dippel. l. c. 115, p. p. m., non Aiton.

B. vulgaris var. *typica* Fiori in Fiori & Paoletti, Fl. Anal. Ital. 529, fig. 1641 (1898).

B. vulgaris var. *typica* f. *subrotunda* Schneider in Bull. Herb. Boiss. sér. 2, VIII. 668 (1905).

B. vulgaris subsp. *eu vulgaris* Briquet, Prodr. Fl. Cors. I. 639 (1910).

B. actinocarpa Hort. ex Hort. Kew. 1880.

B. microphylla Hort., ex parte.

B. sanguinolenta Hort., ex parte, non Schrader.

B. vulgaris maxima Hort. ex Hort. Kew. 1880.

Of the garden forms of *B. vulgaris* the following should be mentioned:

Berberis vulgaris f. albospicata Bean, Trees & Shrubs Brit. Isles, 252 (1914).

A typo ex auctore recedit innovationibus foliisque juvenilibus lacteis. Bean says: "Young shoots and leaves creamy white." Probably this is only a subform of f. *albo-variegata*.

Berberis vulgaris f. argenteo-marginata Usteri in Mitt. Deutsch. Dendr. Ges. VIII. 93 (1899).

? *B. vulgaris* fol. *variegatis* Schultes in Roemer et Schultes, Linn. Syst. Veg. pt. I. 2 (1829).—Kirchner in Petzold & Kirchner, Arb. Musc. 137 (1864).

B. vulgaris fol. *argenteo-variegatis* Koch, Hort. Dendr. 17 (1853).

B. vulgaris 4c. *marginata* O. Kuntze, Taschenfl. Leipz. 170 (1867), pro parte.—Salomon, Deutschl. Winterh. Baeume, 110 (1884).

B. vulgaris α . *normalis* k. *marginata* Regel in Act. Hort. Petrop. II. 412 (1871).

B. vulgaris *normalis* *albo-variegata* Zabel in Beissner, Schelle & Zabel, Handb. Laubh.-Ben. 111 (1903).

B. vulgaris *typica* f. *albi-marginata* et f. *albi-variegata* Voss in Putlitz et Meyer Landlex. v. 709 (1913).

B. vulgaris var. *albo-variegata* Rehder in Bailey, Stand. Cycl. Hort. I. 489 (1914).

A typo recedit foliis saepe satis parvis albo-variegatis vel albo-marginatis.—To this form belong all the forms with white-variegated leaves. Schultes' form "fol. variegatis" is quite uncertain. This is the case, too, with *B. vulgaris* var. *variegata* Hort. ex Jacques et Herincq, Man. I. 52 (1847). None of these authors states whether the variegation of the leaves is whitish or yellow. Kirchner does not say where he got his form from, stating only: "Eine kleinblättrige Spielart, deren Blätter weiss gestreift sind."

B. vulgaris f. *atropurpurea* Regel in Gartenfl. IX. 2, t. c. 278, f. 1 (1860).

B. vulgaris var. *purpurea* Bertin in Jacques & Herincq, Man. Pl. Arb. I. 52 (1847), non De Candolle.

B. vulgaris foliis *purpureis* Koch, Hort. Dendr. 17 (1853).

B. vulgaris o. *B. purpurea* Koch in Wochenschr. Ver. Bef. Gartenb. Preuss. IV. 75 (1861).

B. vulgaris α . *normalis* n. *atropurpurea* Regel in Act. Hort. Petrop. II. 412 (1873).

B. vulgaris g. *B. atropurpurea* Lauche, Deutsche Dendr. 367 (1880).

B. vulgaris f. foliis *atropurpureis* Schuebeler, Virid. Norveg. II. 295 (1880).

This is the finest of all the garden forms of *B. vulgaris*. It was first described by Jacques et Herincq, I. c., as follows: "*B. vulgaris* var. *purpurea* Bertin. Cet arbuste obtenu, il y a quelques années, de semis par Bertin, à Versailles, diffère de l'ésp. par son feuil. pourpre-foncé, ainsi que

la face interne des sepales." The name *purpurea* has however already been used for another form. This variety is one of the parents of *B. ottawensis* (see above). The young shoots, too, are often somewhat purplish.

B. vulgaris* f. *aureo-marginata Salomon, Deutsche Baeume Straeuch. 110 (1884).

B. vulgaris v. 3 *foliis aureo-marginatis* Kirchner in Petzold et Kirchner, Arb. Musc. 137 (1864).

B. vulgaris v. *marginata aurea* Jäger, Zierg. 127 (1865).

B. vulgaris 4c. *marginata* O. Kuntze, Tasch.-Fl. Leipz. 170 (1867), pro parte.

B. vulgaris normalis l. *aureo-marginata* Regel in Act. Hort. Petrop. II. 412 (1873).

? *B. vulgaris* x. *normalis* m. *aurea* Regel, l. c., non *B. vulgaris aurea* Jäger (1865).

? *B. vulgaris* v. *ovalifolia aurea* Lavallée, Arb. Segrez. 12 (1877).

B. vulgaris forma *B. aurea* Lauche, Deutsch. Dendr. 367 (1880).

B. vulgaris a. *B. marginata* Mouillefert, Trait. Arb. I. 145 (1891).

B. vulgaris variegata Nicholson in Garden, xxxv. 265 (1889).—Bean, Trees a. Shrubs Brit. Isles, I. 252 (1914).

B. vulgaris aurea Hartwig, Ill. Gehölzb. 74 (1892).

B. vulgaris v. *typica* f. *aureo-marginata* Voss in Püllitz & Meyer, Landlex. v. 708 (1913).

The origin of the yellow-variegated form seems to be unknown. Kirchner says: "Eine Spielart mit grossen, rundlichen, gelbumsäumten Blättern, die wir unter obigem Namen aus den Flottbecker Baumschulen erhielten. Ob dies dieselbe Form ist, die Prof. Koch (Wochenschrift IV. 94) als *B. marginata* zu *B. canadensis* Prsh. zieht, vermögen wir nicht zu sagen." *B. vulgaris aurea* Jäger, Ziergehölze 127 (1865), refers to the color of the flowers, and Jäger probably had the doubtful *B. aurea* of Tausch in mind.

B. vulgaris* f. *Egbertii Schneider, c. n.—*B. purpurea Egbertii* Hort. ex Gibbs in Jour. R. Hort. Soc. XXXIII. 348 (1908).—I know this form only from the following statement of Gibbs: "The purple leaves are faintly striped or powdered with white." It may be only a subform of f. *atropurpurea*.

B. vulgaris* f. *lucida Gordon in Loudon, Gard. Mag. n. s. VI. 2 (1840).

B. lucida Schrader in Linnaea, XII. 363 (1838).—Schneider in Mitt. Deutsch. Dendr. Ges. XV. 175 (1907).

B. vulgaris a. *B. lucida* Koch in Wochenschr. Ver. Bef. Gartenb. Preuss. IV. 75 (1861).

Schrader says as to the origin: "Hab. in Iberia." I have seen his type, and I know of no form from Iberia or western Asia that might be even compared with it. According to the type and Schrader's own description *B. lucida* is nothing but a form of *B. vulgaris*. There is no character pointing to any hybrid influence. Specimens from Kew, collected on May 11, 1880 and August 11, 1882 differ from typical *B. vulgaris* only by their smaller fruits which measure scarcely up to 7 mm. in length. What I know under the name of *B. lucida* in our gardens has purple shoots and has nothing to do with Schrader's true form.

B. vulgaris f. alba Weston, Bot. Univ. I. 20 (1770); Fl. Angl. 4 (1775).—De Candolle, Syst. Nat. II. 6 (1821).

Berberis dumetorum fructu candido Miller, Cat. Trees Pl. Lond. 12 (1730).

Berberis fructu albo Miller, Gard. Dict. no. 4 (1731).

B. vulgaris forma fructu albo Miller, l. c. ed. 8, no. 1 (1768).

B. alba Poiteau et Turpin in Duhamel, Traité Arb. Fruit n. ed. III. 52, t. c. 52 (1835).

B. vulgaris flava Schrader in Linnaea, XII. 364 (1838).

B. vulgaris fructu albo Kirchner, Arb. Musc. 137 (1864).

B. vulgaris 1c. leucocarpa O. Kuntze, Tasch.-Fl. Leipz. 170 (1867).

B. vulgaris α. normalis f. *leucocarpa* Regel in Act. Hort. Petrop. II. 412 (1873).

A typo ex auctoribus nonnisi colore lacteo (haud distincte albo) recedit.

I have never met with this form in gardens. Poiteau et Turpin say that the fruits are "d'un blanc jaunatre," and "cette espèce est rare dans les jardins, probablement parcequ'elle ne produit que très peu de fleurs et presque point de fruits."

B. vulgaris f. dulcis Loudon, Arb. Brit. III. 301 (1838).—Endlicher, Cat. Hort. Acad. Vindob. I. 230 (1843).

B. vulgaris fructu dulci Schultes, Syst. Veg. VII. pt. 2 (1829).

B. dulcis Hort. Angl. ex Schrader in Linnaea, XII. 374 (1838), non Sweet.

B. vulgaris f. B. mitis Koch in Wochenschr. Ver. Gartenb. Preuss. IV. 75. (1861), non *B. mitis* Schrader.

B. vulgaris v. edulis et var. *mitis* Jäger, Zierg. 127 (1865).

B. vulgaris 2b. glycypharoides O. Kuntze, Tasch.-Fl. Leipz. 170 (1867).

B. vulgaris normalis c. *edulis* Regel in Act. Hort. Petrop. II. 411 (1873).

B. esculenta Hort. ex Kirchner in Petzold & Kirchner, Arb. Musc. 133 (1864).

A typo nonnisi fructibus vix acidulis recedit.

According to a note in Trans. Hort. Soc. IV. 407 (1822), this form has been detected by H. Schott in the Austrian Alps as Jacquin wrote in a letter addressed to the Horticultural Society of London received on February 8, 1820. Endlicher cites var. *dulcis* "Host." Host, however, in his Fl. Austr. I. 454 (1827) only says: "Inveniuntur in Austria inferiore prope Gutenstein individua fructus dulces ferentia.

B. vulgaris f. enuclea Weston, Fl. Angl. 4 (1775).—Reichert, Hort. Reich. 3 (1804).

B. sine acinis Gerard, Cat. Arbor. 4 (1599).

Berberis ἀσπερος Clusius, Hist. I. 121 (1601).

B. sine nucleo C. Bauhin, Pinax. 454 (1623).

B. dumetorum sine nucleo Miller, Cat. Trees Pl. Lond. 12 (1730).

B. vulgaris sine nucleo Weston, Bot. Univ. I. 20 (1770).

B. vulgaris f. asperma Willdenow, Berl. Baumz. 34 (1796).

B. abortiva Renault, Fl. Dep. Orme 179 (1804).

B. vulgaris var. *sterilis* Desfontaines, Hist. Arb. II. 27 (1809).

B. vulgaris apyrena Schrader in Linnaea, XII. 364 (1838).

B. vulgaris 3b. *degener* O. Kuntze, Tasch.-Fl. Leipz. 170 (1867).

A typo nonnihil differt fructibus omnibus vel pro parte aspermis.

This is the oldest garden form of which Clusius (1601) says: "Istius porro Berberis genus, Aschafenburgi ad Moenum quinis supra Francofurtum miliaribus, inveniri, cuius baccae sive acini granis interioribus careant, ad conidendum procul dubio aptissimi, non modo intelligebam,

sed manu ejus fruticem in culto horto Ioannis Müller diligentissimi Pharmacopaei et civis Francofurtensis conspiciebam." Duhamel, *Traité Arb. Fruit.* I. 151 (1768) states: "Cette variété se trouve dans la forêt de Lions (Lyons) dans plusieurs endroits du Vexin Normand et des environs de Rouen. Les confitures d'Épine-vinette sans pepin qui se font dans cette ville sont fort connues." Young plants produce at first fruits with seeds as already observed by Miller, Duhamel and Loudon, of the old plants the fruits become seedless. Sometimes such a form may be observed of other species, too.

B. vulgaris f. lutea L'Héritier apud De Candolle, *Syst. Nat.* II. 6 (1821).

B. vulgaris flava Heynold, *Nomcl. Bot. Hort.* 118 (1840), *fide* II. 55 (1846).

B. vulgaris normalis xanthocarpa Zabel in Beissner, Schelle, Zabel, *Handb. Laubhb.* 111 (1903).

A typo nonnisi fructibus luteis flavisve differt.

The fresh fruits are of a beautiful yellow. This form may be connected by intermediate forms with *f. alba*.

B. vulgaris f. microcarpa Schrader in Linnaea, XII. 366 (1838).

B. silvestris Poiteau & Turpin in Duhamel, *Traité Arb. Fruit.* n. ed. III, 15*, t. 15 (1835).

? *B. vulgaris* h. *B. Jacquinii* Schrader ex Koch in *Wochenschr. Ver. Bef. Gartenb. Preuss.* IV. 75 (1861).

A typo ex auctore differt baccis minoribus subgloboso-ellipticis; *B. silvestris* ex auctoribus et icona praecipue fructu parvo obovato distincta esse dicitur, probabiliter ab varietatibus duobus alteris citatis non est diversa.

I take as the type of this form *B. silvestris* of Poiteau & Turpin who say: "Celle-ci, plus petite dans toutes ses parties, est la moins connue et la moins cultivée, sans doute à cause de la petitesse de ses fruits. Nous en devons la connaissance à M. Noisette qui, le premier, l'a distinguée dans son école." Noisette does not mention this form in *Man. Comp. Jard.* II. 579 (1825). Koch says (*Dendr.* I. 394 [1869]) that he found as *B. Jacquinii* in the gardens a form with small roundish-elongate fruits that may be a cross with *B. canadensis*. In this case it ought to be referred to *B. declinata*. See also below under *f. macrocarpa*.

B. vulgaris f. macrocarpa Jäger, *Ziergeh.* 127 (1865).

B. vulgaris fructu maximo Hornemann, *Hort. Bot. Hafn.* I. 348 (1813).

B. latifolia Poiteau et Turpin in Duhamel, *Traité Arb. Fruit.* n. ed. III. 60 (1836), non Ruiz et Pavon.

? *B. vulgaris v. speciosa*, var. *serotina* et var. *macrocarpa* Schrader in Linnaea, XII. 365 et 370 (1838).

B. monspeliensis Hort. ex Lavallée, *Arb. Segr.* 12 (1877), pro synon.

A typo ex auctoribus fructibus majoribus differt. *B. latifolia* ex auctoribus et icona foliis et fructibus majoribus diversa est. Var. *serotina* ex auctore baccas miniato-coccineas habet et forma a Duhamel picta haud dissimilis esse sed fructus colore differre dicitur.

The origin of this form is unknown, it is probably nothing but a form with larger fruits once used to make sweets in France.

B. vulgaris f. violacea Willdenow, Berlin. Baumz. 34 (1796).

B. violacea Poiteau & Turpin in Duhamel, Traité Arb. Fruit. n. ed. III. 52, t. 59 (1835).

? *B. vulgaris sanguinea* Schrader in Linnaea, XII. 364 (1838).

B. vulgaris à fruit violet Spach, Hist. Vég. VIII. 40 (1839).

B. coerulea Hort. ex Jacques & Herincq, Man. I. 52 (1847), pro synon.

B. vulgaris 1b. *cyanocarpa* O. Kuntze, Tasch.-Fl. Leipzig, 170 (1867).

B. sanguinea K. Koch, Dendr. I. 394 (1869), pro synon.

B. sanguinolenta Hort., ex Koch l. c., non Schrader.

A typo ex auctoribus nonnisi fructibus "violaceis" differt.

Judging by the plate in Poiteau & Turpin's Duhamel it might be a hybrid between *vulgaris* and *chinensis*, but it is doubtful whether the last species has already been in cultivation in 1796 when Willdenow described this form. He says nothing but: "hat vielmehr geteilte Stacheln und dunkelviolette Früchte." Probably it is a form of *vulgaris* with slightly violet fruits. Schrader in Linnaea XII. 366 (1838) in speaking of the "Var. *dubiae*" says: "Baccae vere violaceae in nulla violacea Hort. unquam mihi visae, nec tales refert *B. violaceo fructu* Duh. Arb. Frut. t. 59.—Procul dubio ad aliam aff. sp. referenda est." Specimens named *vulgaris violacea* from Kew (May 11, 1880, and August 11, 1882, no. 673) were mixed with flowering branches of *B. Thunbergii*. Otherwise the flowering branches were very similar to those of *B. vulgaris*, but the fruits were very small, hardly up to 8 mm. long, and somewhat obovoid, much resembling those of var. *microcarpa*.

The following garden forms I have not been able to elucidate:

B. vulgaris 9. *longifolia* Booth apud Loudon, Encycl. Trees 43 (1842).—"Leaves longer than those of the species."

B. vulgaris 10. *glaucia* Loudon, l. c.—*B. glauca* Booth ex Loudon, l. c.—*B. (?iberica) glauca* Booth ex Gordon in Loudon, The Gard. Mag. n. s. VI. 2 (1840).—Gordon says: "This is a distinct but rather slender plant, with small very glaucous leaves, and is nearly related to *B. iberica*, it was received from Messrs. Booth at Hamburg, but it is in other collections under the incorrect name *B. ilicifolia*." Loudon (1842) says: "Mr. Gordon considers this plant as related to *B. sibirica* (sic!); but as it has not yet flowered in the Horticultural Society's Garden this point cannot be determined.

B. vulgaris 11. *mitis* Loudon, l. c. 43 (1842).—"Shoots without spines. Leaves glaucous, rather broader."

B. vulgaris 7. *rotundifolia* Kirchner, Arb. Musc. 138 (1864).—"Eine Form mit mehr rundlichen Blättern."

B. vulgaris var. *rotunda* Jäger, Zierg. 127 (1865).—"Mit runder Frucht."

B. vulgaris var. *cuneata* Hort. ex Lavallée, Arb. Segr. 12 (1877), nom. nud.

B. vulgaris var. *parvifolia* Regel in Act. Hort. Petrop. II. 413 (1872).—*B. cretica* Hort. ex Regel, l. c.—*B. vulgaris* c. *B. brachybotrys* Koch Dendr. I. 396 (1869).—*B. vulgaris* c. *brachybotrys* Koch ex Regel, l. c., pro synon.

B. vulgaris commutata Regel, l. c. 413.—A form with a very mixed synonymy comprising partly forms of *vulgaris* from North America, partly probably of true *canadensis*, partly very uncertain forms.

B. vulgaris var. *virgata* Hort. ex Zabel in Verz. Münd. 6 (1878), nom. nud.

B. vulgaris u. *B. antinocarpus* Hort. ex Mouillefert, Traité Arb. Arbriss. I. 147 (1891).—“Ne diffère pas sensiblement du type.”

During the last ten years some extremely interesting and valuable hybrids have been raised by the late Dr. van Fleet in his garden at Bell Station, Maryland. Dr. van Fleet who was one of the most skillful of American plant breeders was kind enough to send me some material in 1916. On April 26, 1919, I had the opportunity to pay a visit to Bell where I saw a good many more hybrids, and received information and material from Dr. van Fleet himself. I intended to make a thorough study of all these forms, but owing to my departure for Europe in September, 1919, I have not been able to collect more material at Bell, and complete my observations. At present I cannot do more than mention the crosses of which I have seen the plants and of which I possess at least some sterile or flowering material in my herbarium. I can only hope that after the death of Dr. van Fleet these plants were not lost. Somebody else may be able to look them over, and to give full descriptions of them based on copious flowering and fruiting material. There are among these hybrids some plants of high value. The best, so far as I have seen, is the following, which I want to name in honor of its raiser.

× *B. Vanfleetii*, hybr. nov. (*B. Veitchii* × *vulgaris*).

Frutex compactus ad 1.5 m. altus ramis squarrosis paullo dependentibus; ramuli annotini obscure brunnescentes subangulati, biennes pallide flavescentes minutissime pustulati, fere cylindrici, vetustiores cinerascentes; internodia 1.5–2 cm. longa; spinae satis evolutae, 3-fidae, flavescentes, subtus sulcatae, mediae ad 2.5 cm. longae, lateralibus paullo longiores. Folia subsempervirentia, 3–4-fasciculata, matura crasse chartacea vel subcoriacea, elliptica vel obovato-elliptica apice acuta, basi in petiolum subnulum vel ad 5 mm. longum contracta, margine subsinuato-spinoso-serrata dentibus gracilibus utrinque circiter 8–12 ad 1.5 mm. longis minimis exceptis ad 3.5–1.4 cm. magna, superne saturate viridia, subtus pallida, pruinosa, utraque facie laxe elevato-reticulata. Inflorescentiae breviter umbellato-racemosae floribus singulis additis, 4–9-florae, ad 2.5 cm. longae; pedicelli graciles, superiores circ. 5 mm. infimi ad 10 mm. longi, bracteis parvis triangularibus acutis acuminatisve 1–1.5 mm. longis; flores lutei, aperti ad 6–7 mm. diametentes. Fructus elliptici, circiter 8–10 : 6 mm. magni, estylares, cerasini, leviter pruinosi; semina 4, atro-purpurea, circiter 7 mm. longa, laevia.

This hybrid which is almost evergreen has proved much hardier than *B. Veitchii* Schneider (*B. acuminata* Veitch, non Franchet), hardy only in the warmer parts of the United States and Central Europe. *B. Vanfleetii* deserves the attention of all gardeners. The leaves are in part more like those of *B. vulgaris* than of *B. Veitchii*, and often show a very fine serration. The plant needs further observation, and probably some different forms may be raised from its seeds; I already have some material of the second generation which comes much nearer to *B. vulgaris*.

Very different looks another hybrid of *B. Veitchii* with *B. Poiretii* of which I collected flowering specimens at Bell on April 26, 1919. It seems to be a rather remarkable plant but I do not yet want to describe it, as the material I have is too scanty.

Dr. van Fleet made two other crosses of *B. Veitchii*: with *B. verruculosa* Hemsl. & Wilson and with *B. pruinosa* Franch. Of both he had only small plants when I was at Bell, but *B. Veitchii* × *pruinosa* had already flowered.

B. pruinosa had also been crossed with *B. Sargentii* Schneid.

I collected flowering specimens, too, from two hybrids of *B. Thunbergii*: one with *B. Rehderiana* Schneid. and a second one of which *B. Fendleri* Gray is said to be the other parent. Both need further observations.

The last hybrid I wish to deal with in my present note is a possible cross between *B. pruinosa* and *B. diaphana* Maxim. for which I propose the following name:

× *B. Vilmorinii*, hybr. nov.

Frutex satis crasse ramosus; ramuli annotini flavo-brunnei, sulcato-angulati, glabri; biennes flavo-cinerei, vetustiores cinerascentes; internodia 1–2.5 cm. longa; spinae 3-fidae, flavo-brunneae, patentes, mediae 1–2 cm. longae, subtus sulcatae, lateralibus paullo longior bus. Folia 3–5-fasciculata, inaequalia, matura crasse chartacea vel subcoriacea, elliptica, ovato-elliptica vel oblongo-elliptica, apice acuta spinulosa, basi in petiolum subnullum contracta, margine argute spinoso-serrata serraturis utrinque 6–12 aristatis 1.5–2.5 mm. longis, 2–5 cm. longa, 0.8–2 cm. lata, superne saturate viridia, subtus glauca vel albo-viridia, pruinosa, haud vel vix papillosa. Inflorescentiae visae 1-florae; pedicelli ad 2 cm. longi, rubescentes; flores lutei?, circiter 9–10 mm. diametentes?, sepala externa vel prophylla non visa, media late ovata, internis late obovato-ellipticis rotundatis ad 8 mm. longis fere duplo minora; petala late obovata, ad 7 mm. longa, emarginata, basi breviter unguiculata glandulis 2 ovoideis mediocribus aurantiacis separatis praedita; stamina petalis fere duplo breviora, apice distincte apiculata; ovarium ovato-ellipticum, stigmate satis lato, ovulis circiter (5–)7–8 sessilibus. Fructus nondum maturi elliptici, circiter 11 : 5 mm. magni, ut videtur atrocerasini; stigmate subsessili; semina 1–2, nondum perfecte matura.

I received in the autumn of 1916 this peculiar form through the kindness of Mr. M. L. de Vilmorin. He sent me three specimens. One which I regard as the type had been collected in his Fruticetum (Les Barres) on Sept. 21, 1910 ("no. 1008 Y, Berberis du 30.3.05"). It has almost ripe fruits. The second specimen was collected on May 10, 1908 ("Berberis du 30 Mars 1905"); a flowering specimen of the fruiting plant. The third is sterile, collected on Sept. 13, 1916 ("Berberis from Verrières, ? Garden origin").

This form represents apparently a cross between the evergreen *B. pruinosa* Franch., and the deciduous *B. diaphana* Maxim. In its angular twigs, slightly dentate leaves, and in its numerous ovules this hybrid comes nearer *B. diaphana*, but the less veined leaves, the apparently more vigorous growth, the more robust spines, the smaller flowers and the fruits clearly indicate the influence of *B. pruinosa*. From the Kew Arboretum I saw a specimen collected in October, 1916 and bearing the name *B. vulgaris divaricata* that looks much like this hybrid. I wish to name this form in honor of the late Mr. Maurice L. de Vilmorin to whom I am under such great obligations for all the assistance he has given me during my dendrological studies.

BERLIN-DAHLEM, June, 1923.

THE HORTENSIAS
HYDRANGEA MACROPHYLLA DC. AND HYDRANGEA
SERRATA DC.

ERNEST H. WILSON

The flower-loving peoples of China and Japan have cultivated in their gardens from time immemorial a number of plants beautiful for their flowers, foliage, or habit of growth. In the early intercourse of western nations with the Orient it was these that were carried to Europe and many of them have become the most familiar and most prized of our garden plants. The origin of many of these plants is still obscure, though in recent years several have been discovered growing wild in the interior parts of China and Japan. During the twenty years which I have devoted largely to the investigation of the flora of eastern Asia I have taken much interest in the problem of these long-cultivated plants. It has been my good fortune to elucidate the origin of a number including the China Monthly Rose, the Tea Rose, several Azaleas, the Chinese Pear, Apple, Cherry and others including the subject of this note.

There is no more familiar plant in the gardens and greenhouses of this country and of Europe than the so-called Hortensias. These Hydrangeas have been long cultivated in the West and in the hands of the plant-breeders, principally those of France, have given rise to a wonderfully varied group of valuable decorative plants. It was Thunberg, in 1784, who gave the first binominal names to these Hydrangeas but he referred them wrongly to the genus Viburnum. Other botanists at later dates have given them other names. To clear up the synonymy it was necessary to know exactly what the plants were that Thunberg named in his *Flora Japonica*. In order to accomplish this I wrote to Professor H. O. Juel at Upsala who most courteously had made a set of fine photographic prints of Thunberg's specimens. The material in Thunberg's herbarium consists of these seven specimens:

Viburnum macrophyllum $\alpha.$ = *Hydrangea macrophylla* DC.

Viburnum macrophyllum $\beta.$ = *Hydrangea macrophylla* DC.

Viburnum serratum $\alpha.$ = *Hydrangea serrata* var. *stellata* Wils.

Viburnum serratum $\beta.$ = *Hydrangea macrophylla* DC.

Viburnum serratum $\gamma.$ = *Hydrangea serrata* DC.

Viburnum serratum $\delta.$ = *Hydrangea serrata* DC.

Viburnum serratum $\epsilon.$ = *Hydrangea serrata* DC.

The first-named, *Viburnum macrophyllum*, is the familiar Hydrangea with fleshy, shining green leaves and globose heads of pink, blue or white sterile flowers, variously known as *H. opuloides* K. Koch, *H. hortensis* Smith, *H. Hortensia* Sieb. and so forth. The second, *Viburnum serratum*, is the Hydrangea with dull green thinner leaves and more slender shoots which is hardier than the former. Of this, too, there are many garden forms cultivated.

Hydrangea macrophylla* De Candolle, Prodr. iv. 15 (1830).Viburnum macrophyllum* Thunberg, Fl. Jap. 125 (1784).*Hortensia* Commerson apud Jussieu, Gen. Pl. 214 (1789).*Hortensia opuloides* Lamarck, Encycl. Méth. III. 136 (1789); Tab. Encycl. Méth. II. 501, t. 380 (1793).—Jacquin, Fragm. Bot. 7, t. 3, fig. 5 (1800).—Jaume in Nouv. Duhamel, III. 98, t. 24 (1806).*Primula mutabilis* Loureiro, Fl. Cochinch. 104 (1790).*Hortensia japonica* Gmelin in Linnaeus, Syst. Nat. ed. 13, II. pt. 1, 722 (1791).—Buchoz, Monog. Ros. 267 (1804).*Hydrangea hortensis* Smith, Icon. Pict. Pl., t. 12 (1792).—Sims in Bot. Mag. XIII. t. 438 (1799).—Willdenow, Sp. Pl. II. pt. 1, 633 (1799).—Roth, Neue Beytr. Bot. 202 (1802).—Martius, Pl. Hort. Acad. Erlang. 98 (1814).—Savi, Fl. Ital. III. 65, t. 110 (1824).—Franchet & Savatier, Enum. Pl. Jap. I. 150 (1875).—Nicholson, Dict. Gard. II. 162, fig. 252 (1887).—Rehder in Bailey, Cycl. Am. Hort. II. 784 (1900).—Bean, Trees & Shrubs Brit. Isl. I. 625 (1914).—Turner in Gard. Chron. ser. 3, LXXI. 87, fig. 42 (1922).*Hortensia mutabilis* Schneevogt, Icon. Pl. Rar. 36, t. (1793).—Zorn, Auswahl Schön. Gew. III. t. 149 (1796).*Hortensia japonica* Zorn, Auswahl Schön. Gew. III. 58 (1796).*Hortensia rosea* Desfontaines, Tab. Ecol. Bot. 115 (1804).*Hortensia speciosa* Persoon, Syn. I. 505 (1805).—Targioni-Tozzetti in Ann. Imp. Mus. Firenze, I. (Obs. Bot.) 36, t. 2, figs. 51–58, 61, 63, 65–69 (1808).*Hydrangea Hortensia* Siebold in Nov. Act. Acad. Leop.-Carol. XIV. pt. 2, 688 (Syn. Hydrang.) (1829).—De Candolle, Prodr. IV. 15 (1830).—Maximowicz in Mém. Acad. Sci. St. Pétersb., sér. 7, x. no. XVI. 11 (Rev. Hydrang. As. Or.) (1867).—Hemsley in Garden, VIII. 145 (1875); x. 265 (1876).*Hydrangea opuloides* Hort. apud Savi, Fl. Ital. III. 65 (1824), as a synonym.—K. Koch, Dendr. I. 353 (1869).—Koehne, Dendrol. 187 (1893).—Dippel, Handb. Laubholzk. III. 321 (1893).—Schneider, Ill. Handb. Laubholzk. I. 391, fig. 251 e–i (1905).—Rehder in Sargent, Pl. Wilson. I. 37 (1911); in Bailey, Stand. Cycl. Hort. III. 162 (1915).—Matsumura, Ind. Pl. Jap. II. pt. 2, 179 (1912).*Hydrangea Hortensia* γ. *flore pleno* K. Koch, Hort. Dendr. 106 (1853).*Hydrangea japonica* η. *plena* Regel in Gartenfl. XV. 290 (1866).*Hydrangea japonica* η. *Hortensia* Regel in Gartenfl. XV. 290 (1866).*Hydrangea Hortensia* ε. *Hortensia* Maximowicz in Mém. Acad. Sci. St. Pétersb., sér. 7, x. no. XVI. 14 (Rev. Hydrang. As. Or.) (1867).*Hydrangea Hortensis* 2. *hortensis* Franchet & Savatier, Enum. Pl. Jap. I. 152 (1875).—Rehder in Bailey, Cycl. Am. Hort. II. 785 (1900).*Hydrangea Hortensia* e. *communis* Hemsley in Garden, X. 266 (1876).*Hydrangea opuloides* a. *Hortensia* Dippel, Handb. Laubholzk. III. 322 (1893).—Rehder in Sargent, Pl. Wilson. I. 37 (1911); in Bailey, Stand. Cycl. Hort. III. 1621 (1915).—Matsumura, Ind. Pl. Jap. II. pt. 2, 180 (1912).*Hydrangea opuloides* var. *plena* Rehder in Bailey, Stand. Cycl. Hort. III. 1621 (1915).

CHINA; cultivated. Kwangtung, Honan Island, C. O. Levine, No. 849, May 18, 1917; Hupeh, Ichang, A. Henry, No. 7385; Yunnan, Tali Valley, alt. 6700–8000 ft., G. Forrest, No. 5047, August, 1906.

A shrub with many ascending-spreading stems forming a broad, rounded bush from 1 to 4 m. tall, the shoots with abundant pith, clothed with thin, purple-gray to pale gray scaling bark, terete, glabrous, except near inflorescence, with prominent lenticels and leaf-scars. Leaves petiolate, lustrous green, fleshy, subcoriaceous, obovate, rarely ovate or ovate-elliptic, 8–20 cm. long, 4–10 cm. wide, cuspidate or short acuminate, at base cuneate, often broadly so, dentate-serrate, except near base; teeth inclined forward, triangular, terminating in a mucro-like gland, glabrous or slightly puberulous, with occasional axillary tufts of short, curled hairs;

secondary veins arcuate, raised beneath; petiole stout, fleshy, 1.5–6 cm. long, glabrous, flattened above. Inflorescence a much-branched, corymbose, terminal globose head from 15–20 cm. and more through, either sessile or distinctly peduncled, rhachis glabrescent, puberulous or more or less densely clothed with short gray appressed curled hairs; flowers pink to blue, sometimes white, sterile, with 4 spreading petaloid sepals of various size and shape, acute or rounded, entire or notched with few scattered male or apetalous abortive female flowers.

This is the familiar *Hydrangea* with globose heads of sterile flowers of varying shades of pink and blue. One of the most widely cultivated and best-known exotic plants. It has been cultivated for centuries in the Orient, yet its origin has escaped notice and remained unknown until now. It is simply an anomalous condition of a littoral plant very common on the shores of the Boshu peninsula in central Hondo, on Oshima or De Vries' Island, on Hachijo and others of the seven isles of Idzu, described in detail below under the name of *H. macrophylla* var. *normalis*. Where it originated or by whom it was first found and brought into gardens remains a mystery. Very likely it was by some wandering Buddhist priest or acolyte but we shall probably never know. That such a striking plant with splendid flower-heads should spread far and wide among the flower-loving peoples of the Orient should occasion no surprise. Where any remarks on its possible origin have been made in western literature China has been surmised as its native country, probably because so many fine plants have come to us from that land. In this case, however, the credit belongs to Japan.

The replacing of the ordinary flowers by sterile flowers having petaloid sepals occurs in several species of *Hydrangea*. It is found in the Japanese *H. paniculata* Sieb. and in the American *H. cinerea* Small and *H. arborescens* Linn. In China I have collected wild specimens of *H. strigosa* Rehd. with globose heads of neuter flowers. It is probable that this character can and does appear as a sport in many species of *Hydrangea*. Also it occurs in several species of *Viburnum*, and Thunberg doubtless had in mind the sterile form of *Viburnum Opulus* Linn. when he referred this Japanese plant to the genus *Viburnum*. Thunberg's description is quite clear and De Candolle without hesitation refers it to the genus *Hydrangea* but does not suspect its identity with *H. Hortensia* Sieb. which he had described on the same page in his *Prodromus*. The most remarkable thing, however, about its name is the fact that, though many authors have dealt with the plant and several specific names have been established in common usage for it, apparently no one has gone to the trouble of finding out what Thunberg's *Viburnum macrophyllum* really was. For many years the problem of the origin of this plant has greatly interested me. In fact, during all my travels in the Orient I was on the look-out for the wild parent. Yet its discovery in March, 1917, was as surprising as it was welcome. The evidence was plain and conclusive though it seemed incredible that the

wild type of one of the most familiar garden plants should have its home at the very gate as it were of Yokohama and remain unrecognized by any botanist. However, such are the facts. At other times during 1917 and again the following year I prosecuted my investigations so as to leave no possible doubt on the subject. Exigencies of work have prevented the earlier publication of these facts.

The introduction of this plant into Europe seems to have been from China through Sir Joseph Banks early in 1789. In the Kew Bulletin for 1891 there appears a historical account of Kew and on page 305 it is stated that Banks introduced "the first *Hydrangea hortensis* to Kew about the beginning of 1789 for the inspection of the curious. It had begun to flower in the Custom House and its green petals were a puzzle to the botanists of the day. The next day he exhibited it at his house in Soho Square from whence it was removed and lived in Kew, the parent of its numerous progeny now spread all over Europe." In the Botanical Magazine XIII. under t. 438 it is stated that it "was introduced from China to the royal garden at Kew by Sir Joseph Banks in 1790; it was imported by Mr. Slater about the same time, with whom it is said to have first flowered in this country." Jussieu, in basing the genus Hortensia on the plant, calls it the Rose of Japan. Lamarck gives the same vernacular and on the authority of Commerson says it is cultivated in the Isle of France (Mauritius) and that it came originally from Japan and China. The first illustration published of the plant that I have been able to find is by Buchoz in his Fleurs de la Chine pt. 1, t. 45 (1776) with Chinese characters, evidently a copy of a Chinese drawing and rather crude. The first mention of this plant in western literature is by Kaempfer in his Amoenitatum Exoticarum Fasc. v. page 854 (1712) under the vernacular name of "Sijo, vulgo Adsai, it. Ansai & Adsikii." According to Smith there is (or was) a drawing of Kaempfer's under this name in the British Museum. In Japan today it is known as Temari-bana.

As a cultivated plant I am familiar with this *Hydrangea* in many parts of China from the coast to the extreme west and in all the warmer parts of Japan. Where there is iron in the soil the flowers are always blue. Cultivated by florists especially are many fine forms of this *Hydrangea* chiefly raised in France and referred to as French hybrids. From Messrs. Dreer & Co. of Riverton, New Jersey, I have received a set consisting of forty named garden forms but I can find no signs of hybridity in any of these. Apparently the word hybrid has been loosely used though I have no doubt crossings have been made with forms having only a few sterile ray-flowers all of which are referable to the var. *normalis* Wils. In none can I find any signs of the *H. serrata* De Candolle and its forms, the other Japanese species which has been so thoroughly confused with *H. macrophylla* and its varieties.

A form much cultivated is:—

Hydrangea macrophylla f. otaksa Wilson, n. comb.

Hydrangea Otaksa Siebold & Zuccarini, Fl. Jap. I. 105, t. 52 (1840).—Van Houtte in Fl. des Serr. XVII. 35, tt. 1732–33 (1867–68).—Neumann in Rev. Hort. 1868, 452, t.

Hydrangea Hortensis var. *Otaksa* A. Gray in Mem. Am. Acad. n. ser. VI. 312 (Bot. Jap.) (1857).—Maximowicz in Mém. Acad. Sci. St. Pétersb., sér. 7, x. no. XVI. 14 (Rev. Hydrang. As. Or.) (1867).—Hemsley in Garden, x. 266 (1876).

Hydrangea japonica s. *Otaksa* Regel in Gartenfl. xv. 290 (1866).

Hydrangea Hortensis I. *Otaksa* Franchet & Savatier, Enum. Pl. Jap. I. 152 (1875).—Nicholson, Dict. Gard. II. 163 (1887).

Hydrangea opuloides d. *Otaksa* Dippel, Handb. Laubholzk. III. 323 (1893).—Schneider, Ill. Handb. Laubholzk. I. 392 (1905).—Matsumura, Ind. Pl. Jap. II. pt. 2, 180 (1912).—Rehder in Bailey, Stand. Cycl. Hort. III. 1621, fig. 1933 (1915).

This form, characterized by its globose heads of sterile pink or blue flowers, is one of the most popular with florists in America and Europe. Siebold's name "Otaksa" is not used in Japan today and Japanese scholars fail to understand its derivation. A number of named forms are in cultivation including one with pure white flowers and known as *Hydrangea* "Thomas Hogg."

Very similar to the above is:—

Hydrangea macrophylla f. Veitchii Wilson, n. name.

Hydrangea Hortensis var. *japonica rosea* Bean in Garden, L. 122, t. 1079 (1896); not *H. japonica* var. *rosea* S. & Z.

Hydrangea hortensis var. *rosea* M. H. in Gartenwelt, VII. 582, t. (1903).—Griguan in Rev. Hort. 1904, 544, t.

Hydrangea Hortensis var. *rosea* J. H. Veitch, Hortus Veitchii, 368 (1906).

A garden form with deep rose-pink sterile flowers introduced from Japan into England by Charles Maries in 1880.

A form with black-purple shoots is:—

Hydrangea macrophylla f. mandschurica Wilson, n. comb.

Hortensia nigra Carrière in Rev. Hort. 1880, 180.

Hydrangea nigra Carrière, l. c., as a synonym.

Hydrangea Mandschurica nova Baumann apud Carrière, l. c., as a synonym.

Hydrangea ramis pictis Haage & Schmidt apud Carrière, l. c., as a synonym.

Hydrangea opuloides mandschurica h. apud Dieck, Haupt-Cat. Zoeschen, 42 (1885).

Hydrangea ramulis nigris Hort. ex Dieck, l. c. as a synonym.

Hydrangea mandschurica Koehne, Deutsch. Dendr. 187 (1893).

Hydrangea opuloides e. *cyanoclada* Dippel, Handb. Laubholzk. III. 323 (1893).—Rehder in Bailey, Stand. Cycl. Hort. III. 1621 (1915).

Hydrangea hortensis var. *nigra* Rehder in Bailey, Cycl. Am. Hort. II. 785 (1900).—Bean, Trees & Shrubs Brit. Isl. I. 625 (1914).

Hydrangea cyanoclada Hort. ex Bean, Trees & Shrubs Brit. Isl. I. 625 (1914), as a synonym.

A curious form with the young shoots dark purple, almost black, and rose-colored flowers most of which are sterile. The name "mandschurica" is utterly misleading, the plant having nothing to do with Manchuria. This form is cultivated (No. 5285) in the Arnold Arboretum and lives

through the winter in a sheltered situation but never flowers. The *H. Hortensia* $\epsilon.$ *ramis atropurpureis* K. Koch (Hort. Dendr. 106 [1853]) probably belongs here.

A form with double flowers is:—

Hydrangea macrophylla f. *Domotoi* Wilson, n. comb.

Hydrangea Domotoi K. in American Florist, 1923, 861.

Hydrangea Otaksa Domotoi Hort. Dreer & Sons.

The flowers of this form are all sterile and double, lavender to blue in color. It is said to have originated as a sport from *f. Otaksa* and is recognized here as the type of a race with double flowers.

The phylogenetic type may be named:—

Hydrangea macrophylla var. *normalis* Wilson, n. var.

JAPAN: Hondo, Oshima Island, *E. H. Wilson*, No. 8197, March 29, 1917; same locality, *H. Suzuki*, No. 8197a, July, 1917; Boshu peninsula, between Hojo and Kanaya, *E. H. Wilson*, No. 8207, April 11, 1917; Hachijo Island, *E. H. Wilson*, No. 8383, May 6, 1917.

This is the wild type and is distinguished by its flat corymb of hermaphrodite flowers with a few outer sterile pink ray-flowers each from 3 to 5 cm. in diameter. The fruit is stout, yellow-brown and erect, narrow-ovoid, 6–8 mm. long, 3–4 mm. wide, ribbed, crowned by 3 diverging woody styles from 1–3 mm. long; pedicels rigid 7–10 mm. long. The habit, the character of the shoots and the shape and texture of the leaves are all similar to those of the sterile form. The number of ray flowers with petaloid sepals is variable and so, too, is their size, and their color is of varying shades of pink to rosy-red, occasionally bluish or white.

This is a littoral plant abundant on the coasts of Oshima or De Vries' Island and the Boshu peninsula on the east coast of central Hondo and not far from the port of Yokohama. It is also plentiful on Hachijo Island, a volcanic island south of Oshima, and on Aogashima, another island just south of Hachijo. My friend, Dr. T. Nakai, informs me that he has found it wild on North Sulphur Island which is south of the Bonin Islands; also that it grows on the seacoast of Idzu and Sagami in central Hondo. I found the plant first in fruit and young foliage in March 1917 on Oshima and in the July following, my friend, H. Suzuki, collected for me flowering material. In the autumn of the same year I obtained seeds from which plants were raised and are now growing in this Arboretum. On Boshu and Hachijo I saw this plant growing in great quantity and that it is truly indigenous in these places there can be no doubt. Should anyone be disposed to question this as to Boshu and Oshima owing to their proximity to such a centre of culture as Tokyo I do not see how they can question Hachijo which is an out-of-the-way, sparsely inhabited island strewn with blocks of lava. Under the old regime when the Emperor lived in Kyoto and the Shogun in Tokyo, Hachijo was used as a penal settlement. Nevertheless, it is extraordinary that the identity of this plant as the wild parent of the familiar garden *Hydrangea* with globose

heads of sterile flowers should have remained unsuspected, at least so far as books are concerned, for I have searched high and low and can find no suggestion of it. Charles Maries in 1879 visited Oshima and there collected bulbs of *Lilium auratum* var. *platyphyllum* Baker. He must have seen this wild Hydrangea but I can find no record of its being mentioned by him although he did introduce two fine forms of Hydrangeas which are named *Mariesii* and *Veitchii*. Different Japanese botanists have visited Oshima and the other stations of the plant, but I cannot find that any one of them has identified this or saw in it anything significant, although Dr. T. Nakai informs me that he, for some time past, has been aware of its identity, but has not published his conclusions. The wild plant is a shrub from 1 to 3 m. tall with many stems forming a broad bush which occurs either singly or many together making a dense thicket. It grows right on the edge of the foreshore under the full influence of the sea and also inland among volcanic detritus, but all parts of the localities in which I know this plant to be wild are strongly influenced by the sea. The plant is in fact simply and solely a littoral plant, an important point to be remembered when you come to discuss *Hydrangea serrata* DC., with which it is almost inextricably confused. The giving of a special varietal name to the wild plant may conduce to clearness though there is nothing to distinguish it from such garden forms as Siebold's *H. japonica* (which by the way is not the plant known in gardens today by this name) except its entire petaloid sepals which may or may not be a constant character. The Japanese name of this plant is Gaku or Gaku-bana.

A form with blue flowers is:—

Hydrangea macrophylla var. *normalis* f. *coerulea* Wilson, n. comb.

Hydrangea Belzonii Siebold & Zuccarini, Fl. Jap. I. 109, t. 55 (1840).

Hydrangea Japonica var. *caerulea* Hooker in Bot. Mag. LXXII. t. 4253 (1846).

Hydrangea Hortensia β. *coerulea* K. Koch, Hort. Dendr. 106 (1853).

Hydrangea japonica ε. *coerulescens* Regel in Gartenfl. xv. 290 (1866):

Hydrangea Hortensia γ. *Belzonii* Maximowicz in Mém. Acad. Sci. St. Pétersb. sér. 7, x. no. XVI. 14 (Rev. Hydrang. As. Or.) (1867).—Hemsley in Garden, x. 266 (1876).

Hydrangea opuloides e. *Belzonii* Dippel, Handb. Laubholzk. III. 322 (1893).—Rehder in Bailey Stand. Cycl. Hort. III. 1621 (1915).

Hydrangea hortensis var. *Belzonii* Nakai in Tokyo Bot. Mag. XXXI (1917).

Hydrangea opuloides var. *japonica* f. *coerulea* Rehder in Jour. Arn. Arb. III. 43 (1922).

This form is distinguished by its deep blue hermaphrodite flowers and blue or white sterile ray-flowers. The leaves are ovate-elliptic to obovate. As Rehder points out this is a very hardy form.

Siebold figures for his *H. Belzonii* a plant with obovate leaves in whorls of three and states in the text that the leaves are ternate or rarely opposite. I have seen no specimens with leaves so arranged though doubtless it does occur on some cultivated plants. Siebold also states that the ray-flowers are very numerous, being from 12 to 15, and he figures a fragment of an inflorescence in which all the flowers are sterile. A co-type in the Gray Herbarium of the plant referred by Maximowicz to his var. *Belzonii* has

opposite leaves; another specimen in the same herbarium from the Herb. Lugd.-Batav. and named *H. Belzonii* has opposite, ovate leaves and nearly ripe fruits. The Japanese name Oho-Azisai given by Siebold and Zuccarini merely signifies "Large Azisai" and is virtually meaningless.

Another form is:—

Hydrangea macrophylla var. normalis f. azisai Wilson, n. comb.

Hydrangea Azisai Siebold in Nov. Act. Acad. Leop.-Carol. xiv. pt. 2, 689 (Syn. Hydrang.) (1829).—De Candolle, Prodr. iv. 666 (1830).—Siebold & Zuccarini, Fl. Jap. i. 104, t. 51 (1840).

Hydrangea Hortensia var. *Azisai* A. Gray in Mem. Am. Acad. n. ser. vi. 312 (Bot. Jap.) (1857).—Maximowicz in Mém. Acad. Sci. St. Pétersb., sér. 7, x. no. xvi. 14 (Rev. Hydrang. As. Or.) (1867).—Hemsley in Garden, x. 266 (1876).

Hydrangea Hortensis e. *Azisai* Franchet & Savatier, Enum. Pl. Jap. i. 152 (1875).

Hydrangea opuloides b. *Azisai* Dippel, Handb. Laubholzk. iii. 322 (1893).—Schneider, Ill. Handb. Laubholzk. i. 392 (1905).—Rehder in Bailey, Stand. Cycl. Hort. iii. 1621 (1915).

This is a Japanese garden plant distinguished by its ovate to elliptic-ovate leaves, and pale blue to white sterile ray-flowers on very long (2.5 cm.) pubescent pedicels. The vernacular name Azisai is by no means restricted to this particular form and is in fact more generally applied to *H. serrata* DC. which is common on the mountains throughout the length and breadth of Japan.

A form with white ray-flowers is:—

Hydrangea macrophylla var. normalis f. macrosepala Wilson, n. comb.

Hydrangea japonica s. *macrosepala* Regel in Gartenfl. xv. 290, t. 520 (1866).
Hydrangea opuloides f. *macrosepala* Dippel, Handb. Laubholzk. iii. 323 (1893).—Rehder in Bailey, Stand. Cycl. Hort. iii. 1621 (1915).

Hydrangea hortensis var. *macrosepala* Rehder in Bailey, Cycl. Am. Hort. ii. 785 (1900).

This garden form is characterized by its white, toothed, sterile ray-flowers.

A form with pink ray-flowers is:—

Hydrangea macrophylla var. normalis f. rosea Wilson, n. comb.

Hydrangea japonica Siebold in Nov. Act. Acad. Leop.-Carol. xiv. pt. 2, 689 (Syn. Hydrang.) (1829).—De Candolle, Prodr. iv. 666 (1830).—Siebold & Zuccarini, Fl. Jap. i. 106, t. 53 (1840) in part.

Hydrangea japonica var. *rosea* Siebold & Zuccarini, Fl. Jap. i. 107 (in text) (1840).

Hydrangea japonica α. *typica* Regel in Gartenfl. xv. 289 (1866).

Hydrangea Hortensia β. *japonica* Maximowicz in Mém. Acad. Sci. St. Pétersb., sér. 7, x. no. xvi. 14 (Rev. Hydrang. As. Or.) (1867).—Hemsley in Garden, x. 266 (1876).

Hydrangea Hortensis δ. *Japonica* Franchet & Savatier, Enum. Pl. Jap. i. 151 (1875).—Nicholson, Dict. Gard. ii. 162 (1887).

Hydrangea opuloides var. b. *japonica* Schneider, Ill. Handb. Laubholzk. i. 392 (1905).—Matsumura, Ind. Pl. Jap. ii. pt. 2, 179 (1912), in part.—Rehder in Bailey, Stand. Cycl. Hort. iii. 1621 (1915).

This form has pink, more or less toothed ray-flowers, otherwise it is very similar to the wild form. Of the vernacular names cited by Siebold & Zuccarini only "Gakuso" is applicable to this plant. In gardens today the plant generally cultivated under the name of *H. japonica* is not Siebold's plant but is the form *rosalba* of *H. serrata* DC. which is the "Benikaku" of the Japanese. Siebold and Zuccarini applied this vernacular name among others to their *H. japonica* and it is probably this that has lead Japanese botanists astray in the identification of Siebold's species.

A fine garden form is:—

***Hydrangea macrophylla* var. *normalis* f. *Mariesii* Wilson, n. comb.**

Hydrangea Hortensia var. *Mariesii* Bean in Garden, LIV. 390, t. 1196 (1898).—J. H. Veitch, Hortus Veitchii, 368 (1906).

Hydrangea hortensis var. *Mariesii* Bean, Trees & Shrubs Brit. Isl. I. 625 (1914).

Hydrangea opuloides var. *Mariesii* Rehder in Bailey, Stand. Cycl. Hort. III. 1621 (1915).

A garden form introduced into England from Japan in 1880 by Charles Maries characterized by its large, sterile, rose-pink ray-flowers which measure from 7 to 8 cm. across and are entire or sparsely toothed.

A form with variegated leaves is:—

***Hydrangea macrophylla* var. *normalis* f. *maculata* Wilson, n. comb.**

Hydrangea hortensis var. *maculata* Blume, Bijdr. 920 (1826).

Hydrangea japonica fol. *albo-variegatis* van Houtte in Fl. des Serr. VII. 139, t. 696 (1851–52).

Hydrangea Hortensia s. *maculata* K. Koch, Hort. Dendr. 106 (1853).

Hydrangea japonica s. *variegata* Regel in Gartenfl. XV. 290 (1866).

Hydrangea hortensis *variegata* Nicholson, Dict. Gard. II. 163 (1887).

Hydrangea opuloides var. *variegata* Rehder in Bailey, Stand. Cycl. Hort. III. 1622 (1915).

Distinguished by the white edging of the leaves. This form was in cultivation at Batavia at a very early date, having been introduced directly from Japan. Other garden forms with vari-colored leaves are known as f. *tricolor*, *nivalis* and *roseo-marginata*.

***Hydrangea serrata* De Candolle, Prodr. IV. 15, 666 (1830).—Dippel, Handb. Laubholzk. III. 325, fig. 173 (1893).—Schneider, Ill. Handb. Laubholzk. I. 392 (1905).**

Viburnum serratum Thunberg, Fl. Jap. 124 (1784).

Hydrangea Thunbergii Siebold in Nov. Act. Acad. Leop.-Carol. XIV. pt. 2, 690 (Syn. Hydrang.) (1829).—Siebold & Zuccarini Fl. Jap. I. 111, t. 58 (1840).—Maximowicz in Mém. Acad. Sci. St. Pétersb., sér. 7, x. no. XVI. 15 (Rev. Hydrang. As. Or.) (1867).—T. Moore in Gard. Chron. 1870, 1699, fig. 297.—Franchet & Savatier, Enum. Pl. Jap. I. 153 (1875).—Hemsley in Garden, x. 266 (1876).—Nicholson, Dict. Gard. II. 163 (1887).—Bean, Trees & Shrubs Brit. Isl. I. 630 (1914).

Hydrangea Hortensis s. *angustata* Franchet & Savatier, Enum. Pl. Jap. I. 151 (1875).

Hydrangea opuloides e. *angustata* Schneider, Ill. Handb. Laubholzk. I. 392 (1905).—Matsumura, Ind. Pl. Jap. II. pt. 2, 179 (1912), in part.

Hydrangea hortensis var. *serrata* Rehder in Bailey, Cycl. Am. Hort. II. 785 (1900).

Hydrangea opuloides var. *Thunbergii* Makino in Tokyo Bot. Mag. xxvi. 389 (1912).

Hydrangea cyanea Hort. apud Bean, Trees & Shrubs Brit. Isl. I. 630 (1914).

Hydrangea opuloides var. *serrata* Rehder in Bailey, Stand. Cycl. Hort. III. 1621 (1915).

Hydrangea persicifolia Hort. ex Herb. Arnold Arboretum.

JAPAN. Kyushu: prov. Satsuma, Kirishima, alt. 100–1000 m., *Z. Tashiro*, October, 1917; Shikoku, prov. Tosa, Shiraga-yama, alt. 1100 m., *E. H. Wilson*, No. 1720, November 22, 1914; Nanokawa, *K. Watanabe*, July, 1888 (Herb. Gray). Hondo: prov. Settsu, Arima, *A. Henry* (No. m. 83); prov. Yamashiro, Kyoto, June 24, 1911; prov. Shinano, Otake-gawa, alt. 1000 m., *E. H. Wilson*, No. 7767, November 1, 1914; Norikura, *U. Faurie*, No. 6859, August 30, 1905; Ogawa, *J. G. Jack*, September 4, 1905; prov. Sagami, Komagatake, alt. 2000 m., *U. Faurie*, No. 6862, July, 1905; Miyanoshita, *C. S. Sargent*, August 25, 1892; same locality, *Drs. Fred & Charlotte Baker*, June 18, 1914; Hakone, *C. Maximowicz*, 1862 (Herb. Gray); prov. Musashi, Mitsumine-san, *E. H. Wilson*, No. 6963, June 8, 1914; same locality, June 24, 1911; Mt. Buko, *K. Sakurai*, June 25, 1911; prov. Kai, Jizo-gatake, *U. Faurie*, July, 1903; prov. Kozuke, Karuizawa, alt. 1000 m., *E. H. Wilson*, Nos. 7419, 7146, August 1, 1914; prov. Shimotsuke, Nikko region, alt. 1600–2000 m., *E. H. Wilson*, June 28, 1914; Lake Chuzenji, *J. G. Jack*, August 10 and 12, 1905. Without locality ex Herb. Lugd. Batav. as *Hydrangea Buergeri* and *H. japonica* (Herb. Gray).

KOREA: Quelpaert Island, alt. 600 m., *E. H. Wilson*, No. 9402, October 30, 1917; same place and collector, No. 9402a, November 6, 1917; same locality, *U. Faurie*, Nos. 355, 359, 1653, October, 1906, July, 1907; same locality, *E. Taquet*, No. 4240, July 15, 1910.

CULTIVATED: Arnold Arboretum, July 20, 1890, July 9, 1897, Nos. 519, 519-1, 3269; July 6, 1923, *E. H. Wilson*, No. 7621; Kew Gardens, *G. Nicholson*, No. 2900, July 13, 1882; Hort. Muskau, September 15, 1895, ex Herb. Zabel, No. 1881; Botanic Garden, Sapporo, Hokkaido, *E. H. Wilson*, No. 7303, July 29, 1914; same garden, *S. Arimoto*, September 7, 1903 (Herb. Gray).

Shrub 1–2.5 m. tall (usually 1–1.5 m.) with erect slender stems, glabrous or pubescent the first year, clothed with thin brown-purple scaling bark. Leaves membranous, dull dark green, lanceolate or elliptic to ovate, rarely broadest above the middle, without petiole 5–10 cm. long, 1.5–5 cm. wide, acuminate; the base cuneate, rarely abruptly so, sometimes attenuate and oblique, finely or coarsely serrate, often entire at base; the teeth terminating in gland-tipped mucro, sparsely clothed with appressed soft pubescence on both surfaces, with small axillary tufts of curled hairs on the lower surface; midrib with short curled hairs sometimes on upper surface only; petiole 1–2.5 cm. (sometimes 5 cm.) long, usually slender. Flowers blue or white in flat or slightly convex corymbs, 5–10 cm. across with 4 or 5 white, blue or pinkish petaloid, orbicular, ovate or lanceolate, rounded, obtuse or more rarely acute sepals. Capsule thin-walled, ovoid, subglobose, 2–4 mm. long, on a slender pedicel and tipped by 3 short diverging styles.

This is a common woodland plant on the mountains from the extreme south of Japan to southern Hokkaido; it is also plentiful on the Korean island of Quelpaert and on the mainland as far north at least as Chiri-san. At the northern limits of this species the plant is found at sea-level but always in cool situations. It loves woodland soil and shade and it is only at high altitudes and at its northern limits that it grows in open places. The plant varies greatly in the size, shape and dentation of the

leaves and in degree of hairiness; the sterile flowers may be blue, white or pinkish and the shape of the petaloid sepals varies from nearly round to lance-shape and either rounded blunt or pointed. It is a hardy plant and I have seen it flourishing in the Botanic Garden in Sapporo, Hokkaido. In this Arboretum it has flowered many times but the plant does not thrive. It has several Japanese names such as Hosoba-amacha, Yama-ajisai and Sawa-ajisai but the one I heard most usually applied to this plant is Yama-ajisai which may be interpreted Mountain Hydrangea.

As they grow wild no two species could be more distinct than the littoral *H. macrophylla* var. *normalis* Wils. and the woodland *H. serrata* DC., but in herbaria it is not easy to distinguish between dried specimens of the extreme forms of each and this has had much to do with the hopeless confusion between them which obtains in books. The relatively thick, fleshy, shining green leaves of the former and the thin, dull dark green leaves of *H. serrata* readily distinguish the species. The woodland plant is in every way a less vigorous plant than its relative of the seashore whose leaves are usually broadest above the middle and rarely so in the woodland species. From Siebold all authors have recognized under various names these two species as distinct and those familiar with the living plants have never hesitated in the matter but the forms of the dull green membranous-leaved species have been confused under *H. macrophylla*. The synonymy shows this very clearly and perhaps is more expressive than any lengthy explanation could possibly be.

In Thunberg's Herbarium the three specimens named *Viornum serratum* γ , δ , and ϵ are the type of the species.

A form with large leaves is:—

Hydrangea serrata f. *acuminata* Wilson, n. comb.

H. acuminata Siebold & Zuccarini, Fl. Jap. I. 110, tt. 56, 57, fig. 1 (1840) ...
Carrière in Rev. Hort. 1874, 91, t.—Bean, Trees & Shrubs Brit. Isl. I. 625
(1914).

H. Buergeri Siebold & Zuccarini, Fl. Jap. I. 111, t. 57 fig. 2 (1840).

H. Hortensis α *acuminata* Maximowiczii in Mém. Acad. Sci. St. Petersb.,
sér. 7, x. no. xvi. 13 (Rev. Hydrang. As. Or.) (1867), not A. Gray in Scened.
Pl. Wright.—Hemsley in Garden x. 265 (1876).

H. Hortensis α *acuminata* Franchet & Savatier, Enum. Pl. Jap. I. 150 (1875).—
Rehder in Bailey, Cycl. Am. Hort. II. 785 (1900).

H. opuloides var. *acuminata* Dieck, Haupt-Cat. Zoeschen, 42 (1885).—Dippel,
Handb. Laubholzk. III. 323 (1893).—Schneider, Ill. Handb. Lasiopholik I.
391, fig. 250 o-t (1905).—Rehder in Bailey, Stand. Cycl. Hort. III. 163
(1915).

H. opuloides var. *angustata* Matsumura, Ind. Pl. Jap. II. pt. 2, 179 (1910).
part, vix Franchet & Savatier.

H. opuloides var. *acuminata* f. *Bürgeri* Purpus in Moeller's Deutsch. Gr.
Zeit. xxxii. 41, fig. (1917).

JAPAN. Kyushu: Tsu-shima Island, C. Wilford, 1859 (Herb. Gray);
prov. Satsuma, Mt. Kirishina, alt. 100-1000 m., Z. Tashiro, June 11, July 29, 1911;
prov. Osumi, Nishi-kirishima, E. H. Wilson, No. 6244, March 3, 1914; Hono-
prov. Uzen, Adzuma-san, alt. 600-1100 m., E. H. Wilson, No. 7910, July 10,
1914; prov. Ugo, Chokusan, E. H. Wilson, No. 7173, October 11, 1914.

Mutsu, Lake Towada, *E. H. Wilson*, No. 7621, October 5, 1914; Hakkoda-yama, alt. 1000–1500 m., *E. H. Wilson*, No. 7118, July 6, 1914. Hokkaido: prov. Oshima, Hakodate, *C. Maximowicz*, 1861 (Herb. Gray); prov. Shiribeshi, Shiribeshi-san, alt. 1000 m., *E. H. Wilson*, No. 7298, July 27, 1914; prov. Ishikari, Moiwa-dake, ex Herb. Sapporo Agric. College, July 29, 1891; same locality, *C. S. Sargent*, September 17, 1892; same locality, *S. Arimoto*, September 24, 1903, (Herb. Gray); Yubari, *E. Tokubuchi*, August 11, 1893 (Herb. Gray).

KOREA: Quelpaert Island, *E. H. Wilson*, No. 9402, November 2, 1917; same locality, June 25, 1908, *E. Taquet*, Nos. 811, 2886, 2887, June, 1909, July, 1909.

CULTIVATED: Arnold Arboretum, July 9, 1904 (No. 4710); Japan, Hokkaido, Botanic Garden, Sapporo, *C. S. Sargent*, September 16, 1892.

This form may be distinguished by its larger caudate-acuminate leaves 9 to 18 cm. long and 5–12 cm. wide, though it is scarcely worth a distinctive name. It has a similar distribution to the type but is more common in the northern part of Hondo and in Hokkaido. The sterile ray-flowers are usually blue but not invariably so on the wild plants. In books A. Gray is cited as the first to unite Siebold's *H. acuminata* with *H. Hortensia* DC. and there is no doubt Gray intended to do this but the specimens he so named in the Gray Herbarium belong to a different species recently named *H. Kawagoeana* Koidzumi (in Tokyo Bot. Mag. xxxii. 138 [1918]). The material in the Gray Herb. consists of one sheet of four fragments each in flower and bears two labels. One label says, "Loo-choo Islands, Cleopatra Island, T. Small"; the other "Simoda, Japan, C. Wright coll." The material is obviously all from the same plant and I am sure came from Cleopatra Island and not from Simoda. The firm purple-brown bark at once distinguishes this plant from either Siebold's or De Candolle's species.

Another form is:—

***Hydrangea serrata* f. *pubescens* Wilson, n. comb.**

Hydrangea Hortensis β . *pubescens* Franchet & Savatier, Enum. Pl. Jap. i. 151 (1875), not *H. pubescens* Decaisne.

Hydrangea opuloides i. *sinensis* Dippel, Handb. Laubholzk. iii. 324, fig. 172 as *H. sinensis* (1893).

Hydrangea opuloides d. *pubescens* Schneider, Ill. Handb. Laubholzk. i. 392 (1905).—Matsumura, Ind. Pl. Jap. ii. pt. 2, 180 (1912).

Hydrangea sinensis Hort. Simon Louis.

JAPAN. Hokkaido: prov. Oshima, Hakkodate, *Dr. M. Albrecht*, (Herb. Gray).

KOREA: Quelpaert Island, October, 1906, *U. Faurie*, No. 357; same locality, *E. Taquet*, No. 810, July, 1908.

CULTIVATED: Arnold Arboretum, No. 2443-2; Hort. Simon Louis, 1888, Herb. H. Zabel.

This pubescent form with ovate to ovate-elliptic, caudate-acuminate leaves is fairly distinct though very close to the form *acuminata*. The sterile ray-flowers are pink and white and the fertile flowers blue. The principal veins on the underside are bearded with soft appressed and spreading hairs; the base of the leaf is rounded and abruptly cuneate or narrow and cuneate. The Japanese name of this form is Iwa-gaku.

A form with flowers of various colors is:—

Hydrangea serrata f. rosalba Wilson, n. comb.

Hydrangea japonica Siebold & Zuccarini, Fl. Jap. I. 106 (1840), in part.—Lindley in Bot. Reg. xxx. t. 61 (1844).—Paxton, Mag. Bot. XII. 199, t. (1846).—Bean, Trees & Shrubs Brit. Isl. I. 626 (1914).

Hydrangea japonica rosalba Van Houtte in Fl. des Serr. XVI. 75, tt. 1649–50 (1865–66).—Carrière in Rev. Hort. 1866, 432, t.—Regel in Gartenfl. XV. 290 (1866).

Hydrangea japonica β. *Lindleyi* Regel in Gartenfl. XV. 289 (1866).

Hydrangea opuloides α. *roseo-alba* Dippel, Handb. Laubholzk. III. 324 (1893).

Hydrangea Hortensis var. *Lindleyana* Nicholson in Garden, XLVI. 466 (1894).

Hydrangea Lindleyana Nicholson in Garden, XLVI. t. 990 (1894).

Hydrangea hortensis var. *rosalba* Rehder in Bailey, Cycl. Am. Hort. II. 785 (1900).

Hydrangea opuloides var. *Lindleyana* Rehder in Bailey, Stand. Cycl. Hort. III. 1621 (1915).

Hydrangea opuloides var. *rosalba* Rehder in Mitt. Deutsch. Dendr. Ges. XXIV. 220 (1915).

CULTIVATED: Arnold Arboretum (Nos. 516, 516–1, 517, 517–1, 521, 521–1, 522–1, 2210–1, 2442, 2444); Hort. Bot. Washington, A. Rehder, June 27, 1900; Hort. Kew, G. Nicholson, Nos. 1777, 1784, 1789, July 19, 1880; Hort. Bot. Gard. Kiel, B. Graef, No. 3557, 1897. Japan; Hort. Sakurai, K. Sakurai, May 12, 1906; Tokyo, K. Miyabe, June 10, 1882.

In this form the leaves are somewhat pubescent on the underside and on the upper surface of the midrib especially at the base, and vary in shape from obovate to ovate-elliptic. The sterile ray-flowers may be white or pink or in fading may change from one color to the other. The petaloid sepals may be deeply or sparingly toothed, or they may be entire. It is a variable and very common form and is often cultivated under the erroneous name of *H. japonica*. There are also very many garden forms of this plant; indeed, most of them which have been raised in France and have dull green leaves have been derived from it; such is *H. "Impératrice Eugénie"* Carrière in Rev. Hort. 1868, 469, t.

A form with numerous sterile flowers is:

Hydrangea serrata var. *stellata* Wilson, n. comb.

Hydrangea Sitsitan Siebold in Nov. Act. Acad. Leop.-Carol. XIV. pt. 2, 692 (Syn. Hydrang.) (1829).—De Candolle, Prodr. IV. 666 (1830).

Hydrangea stellata Siebold & Zuccarini, Fl. Jap. I. 112, t. 59 (1840).—Regel in Gartenfl. XV. 291 (1866).—Bean, Trees & Shrubs Brit. Isl. I. 626 (1914).

Hydrangea stellata β. *prolifera* Regel in Gartenfl. XV. 291, t. 521 (1866).—Nicholson, Dict. Gard. II. 163 (1887).

Hydrangea Hortensis η. *stellata* Maximowicz in Mém. Acad. Sci. St. Pétersb., sér. 7, x. no. XVI. 14 (Rev. Hydrang. As. Or.) (1867).—Hemsley in Garden x. 266 (1876).

Hydrangea Hortensis 3. *stellata* Franchet & Savatier, Enum. Pl. Jap. I. 152 (1875).

Hydrangea opuloides h. *stellata* Dippel, Handb. Laubholzk. III. 324 (1893).—Schneider, Ill. Handb. Laubholzk. I. 392 (1905).—Matsumura, Ind. Pl. Jap. II. pt. 2, 180 (1912).—Rehder in Bailey Stand. Cycl. Hort. III. 1622 (1915).

Hydrangea opuloides var. *prolifera* Rehder in Bailey, Stand. Cycl. Hort. III. 1622 (1915).

This is a sterile form with numerous petaloid sepals, pink rose or white in color and ovate to lanceolate in shape. Siebold records it as cultivated

round Kyoto. It is in fact a common plant in Japanese gardens where according to Matsumura it is known as Shichidankwa. There are a number of garden forms cultivated of which "fimbriata" and "rubroplena" are examples. There seems no good reason for keeping Regel's f. *prolifera* distinct from the type.

In Thunberg's Herbarium the specimen named *Viburnum serratum* α . represents the var. *stellata* but I do not think that this specimen should be considered the type since Thunberg does not cite under his description any particular specimen and since the majority of them belong to the form here considered the typical *H. serrata* DC.

NEW SPECIES, VARIETIES AND COMBINATIONS FROM THE HERBARIUM AND THE COLLECTIONS OF THE ARNOLD ARBORETUM¹

ALFRED REHDER

Sinowilsonia Henryi Hemsley in Hooker's Icon. xxix. t. 2817 (1906).—Rehder & Wilson in Sargent, Pl. Wilson. I. 429 (1913).

Descriptioni adde: Flores monoeci, proterandri, racemosi; racemi terminales, masculi et feminei plerique in ramis distinctis; racemi masculi praecoces, e gemmis aphyllis terminalibus orti, pedunculo brevi 5–8 mm. longo incluso 4–6 cm. longi, penduli, multiflori, densi; rhachis sparse fusco-stellato-pilosa; flores apetali et sine ullo vestigio ovarii, bracteati bracteis linearisubulatis pedicellum paullo superantibus sparse fusco-stellato pilosis a basi pedicelli plerisque plus minusve remotis; pedicelli sparsissime stellato-pilos, 1.5–3 mm. longi, bracteolis 2 lateralibus bracteis simillimis sed brevioribus plerisque circa medium insertis instructi; sepala 5, linearispathulata, 3–4 mm. longa, antheras vix vel paullo superantia, dorso apicem versus dense fusco-stellato-pilosa, post anthesin recurva, plus minusve irregulariter inserta et non stricte verticillata; stamina 5, episepala, filamentis brevissimis basi sepalorum adnatis, antheris anguste ovalibus 2.5 mm. longis apiculatis rimis lateralibus dehiscentibus: racemi feminei densi, sub anthesi in plante nostra 1.5–2.5 cm. longi, demum multo elongati; flores cum stigmatibus inclusis 5 mm. longi; calycis tubus sub anthesi 1.5 longus et ovarium paullo tantum superans; sepala 2 mm. longa; stigmata violacea.

The flowering for the first time in this Arboretum of *Sinowilsonia Henryi* offered an opportunity to study the hitherto unknown staminate flowers, which, as the description shows, are greatly simplified in their structure. The flowers are arranged in catkin-like racemes very similar in appearance to those of some Amentaceae, particularly to certain Poplars. The whole floral structure appears more or less irregular; the bracts are inserted,

¹ Continued from p. 116.

usually considerably below the pedicel to which they belong and appear therefore irregularly scattered between the pedicels along the rhachis; the anthers and the sepals before anthesis are nearly or quite of the same length and are inserted approximately at the same height, but during anthesis the axis lengthens and disarranges the floral whorls which become thus more or less racemose. The tendency at the same time of the parts to assume an unilateral position and the absence of any vestige of an ovary makes the similarity of the inflorescence to that of *Populus* still greater. The stamine flowers of *Sinowilsonia* certainly show greater approach to a primitive structure than those of any of the related genera and in the catkin-like shape of the inflorescence resemble the incompletely known stamine flowers of *Fortunearia* (see Rehder & Wilson in Sargent, Pl. Wilson. I. 428) which, however, have at least a rudimentary ovary. The much elongated calyx-tube of the pistillate flower, as described and figured by Hemsley, represents the state as it appears some time after anthesis. During anthesis it is not much longer than the ovary, but it begins to lengthen afterwards, as the growing flowers on our living plant have shown.

Tilia platyphyllos var. *rubra*, comb. nov.

T. europaea 5. *rubra* Weston, Bot. Univ. I. 298 (1770).

T. europaea 6. *corallina* Aiton, Hort. Kew. II. 229 (1789).

?*T. rubra* De Candolle, Cat. Pl. Monspel. 150 (1813); Prodr. I. 513 (1825), in part.

T. corallina Smith in Rees, Cycl. XXXV. no. 2 (1819).—Bosc in Encycl. Méth. Agric. VII. 748 (1821).

T. rubra G. Don, Gen. Syst. I. 553 (1831), in part.—Kirchner in Petzold & Kirchner, Arb. Musc. 155 (1864), in part.

T. mollis var. *corallina* Spach in Ann. Sci. Nat. sér. 2, II. 338 (1834).

T. grandifolia 7. *rubella* Ortmann in Flora, XVIII. 502 (1835).

T. platyphyllos var. *corallina* Hartwig & Ruempler, Bäume & Sträuch. 570 (1875).—Dippel, Handb. Laubholzk. III. 61 (1893), in part.

T. grandifolia *corallina* C. Koch¹ apud Beissner, Schelle & Zabel, Handb. Laubholz-Ben. 339 (1903).

The oldest varietal name for this form is apparently *rubra*, based on *T. europaea* var. *rubra* Weston. This is identical, at least in part, with *T. rubra* G. Don, and probably also with *T. rubra* De Candolle, Cat. Pl. Monspel. 150 (1813), and Prodr. I. 513 (1825), a name applied by many authors to an entirely different species; a few remarks about this and *T. corinthiaca* Bosc may not be out of place here.

Tilia rubra was described by De Candolle in 1813 as intermediate between *T. microphylla* (= *T. cordata* Mill.) and *T. platyphyllos* and he stated that it was first separated by Bosc from these two European species and that it is commonly cultivated as a shade tree under the names "Tilleul a bois rouge," "Tilleul de Corinthe;" from the latter name he assumes that it was introduced from Greece. These remarks seem to

¹K. Koch did not publish this combination; in 1853 (Hort. Dendr. 50) he cites *T. europaea* var. *corallina* Ait. as a synonym of *T. rubra* and in 1869 (Dendr. I. 472) he mentions *T. europaea* *corallina* among the forms of *T. platyphyllos* without making a varietal combination.

indicate that De Candolle as well as Bosc had in mind the hybrid between *T. cordata* and *T. platyphyllus* described the same year as *T. vulgaris* Hayne (*T. hybrida* Bechstein, a form or synonym of *T. vulgaris*, was first described and figured by Bechstein in 1819 in his *Forstbot.* ed. 3, 1463, tab. 4, not in 1810 as quoted by Schneider, and not by Behlen in ed. 5 as quoted in *Index Kewensis*), but the description of the under side of the leaves, the petioles and the branchlets as "pilosiuscula" and of the bark of the branches as red may be taken to indicate that the authors had before them a form of *T. platyphyllus* and probably the var. *rubra*. Bosc himself in 1821 refers his "Tilleul de Corinthe" to *T. corallina* (in *Encycl. Méth. Agric.* VII. 748) and Spach (in *Ann. Sci. Nat. sér. 2*, II. 337 [1834]) refers both names as synonyms to his *T. mollis* (= *T. platyphyllus*). In 1825 De Candolle gives "Tauria" as the habitat of *T. rubra* and cites a specimen collected by Steven without changing the description from that of 1813. This is not identical with *T. rubra* of Simonkai and of later authors which I refer to *T. dasystyla* Stev. (*T. begoniifolia* Stev., *T. multiflora* Ledeb., *T. caucasica* Rupr.), nor is it the *T. corinthiaca* of Simonkai (in *Mat. Term. Közl. Mag. Tud. Akad.* XXII. 330 [1888]); the characters of these two species do not agree with the descriptions given by Bosc and De Candolle and it is very unlikely that any of them were in cultivation at that time, while Bosc states that his "Tilleul de Corinthe" has been in cultivation since time immemorial. In regard to *T. corinthiaca* Bosc it should be stated that the name did not originate with Bosc who calls it "Tilleul de Corinthe" (in *Nouv. Cours Agric.* XII. 139 [1809] and in ed. 2. XXIII. 406 [1823]). Who first latinized Bosc's name I cannot say with certainty; I find it first mentioned by De Candolle in 1824 (*Prodr.* I. 513) as a synonym of his *T. rubra* for which he gives "Tauria" as the native country. This would leave without a name the form occurring in Greece and distinguished by Simonkai as *T. corinthiaca* Bosc, but I doubt if it is specifically distinct from *T. dasystyla* Stev.

Helianthemum nummularium var. **cupreum** Schneid. f. **crocatum**, comb. nov.

H. hyssopifolium α. *crocatum* Sweet, *Cist.* 29, t. (1825-30).

H. chamaecistus var. ζ. *cupreum* Grosser in Engler, *Pflanzenr.* IV-193, 84 (1903), in part, as to synon. α. *crocatum*.

H. vulgare var. *crocatum* Bean, *Trees & Shrubs Brit. Isl.* I. 617 (1914).

This form differs from var. *cupreum* only in its saffron-yellow flowers more or less suffused with a ferrugineous or coppery tint.

As Janchen has shown (in *Oesterr. Bot. Zeitschr.* LVIII. 406-413 [1908]) the correct name according to the International Rules of the Sun Rose usually called *Helianthemum chamaecistus* Mill. or *H. vulgare* Gaertn. is *H. nummularium* Mill. based on *Cistus nummularius* L. Janchen, however, distinguishes besides *H. nummularium* the following species: *H. hirsutum* Mérat, *H. nitidum* Clementi, *H. tomentosum* Spreng. and *H. grandiflorum* Lam. & DC. which all seem to be connected by intermediate forms and are best considered varieties or subspecies of *H. nummularium*. Most of

the resulting new combinations have been already made by C. Schneider (Ill. Handb. Laubholzk. II. 351-352, 1909), but a few forms not unfrequently met with in gardens, as the one cited above and the following, were not mentioned by him.

Helianthemum nummularium var. *mutable*, comb. nov.

Cistus mutabilis Jacquin, Misc. II. 340 (1781); Icon. Pl. Rar. I. 10, t. 99 (1781-86).

Helianthemum mutable Persoon, Syn. II. 79 (1807).—Guimpel, Otto & Hayne, Abb. Fremd. Holzart. 56, t. 46 (1819-1825).—Sweet, Cist. 106, t. (1825-30).

H. vulgare var. e. *mutable* Willkomm, Icon. Descript. Pl. II. 116 (1856).

H. chamaecistus var. e. *mutable* Grosser in Engler, Pflanzenr. IV-163, 86 (1903).

This variety has the leaves sparingly pilose above or nearly glabrous and gray-tomentose beneath. The sepals are reddish and villose on the ribs and glabrous between them; the petals are pale rose or sometimes variegated with white.

Helianthemum nummularium var. *stramineum*, comb. nov.

H. stramineum Sweet, Cist. 93, t. (1825-30).

H. chamaecistus var. ζ. *stramineum* Grosser in Engler, Pflanzenr. IV-163, 86 (1903).

H. vulgare var. *stramineum* Bean, Trees & Shrubs Brit. Isl. I. 617 (1914).

This variety has the leaves green and pilose above, whitish tomentose beneath, flat or scarcely revolute at the margins; the sepals are nearly glabrous and the petals sulphur-yellow with a darker yellow blotch at base.

Helianthemum nummularium var. *venustum*, comb. nov.

H. venustum Sweet, Cist. 10, t. (1825-30).

H. mutabile var. *canescens* (Sweet) K. Koch, Hort. Dendr. 37 (1853), in part.

H. chamaecistus var. ε. *venustum* Grosser in Engler, Pflanzenr. IV-163, 86 (1903).

H. vulgare var. *venustum* Bean, Trees & Shrubs Brit. Isl. I. 617 (1914).

This variety has purplish branchlets and the leaves glabrescent and lustrous above, whitish tomentose beneath; the sepals are stellate-pubescent, the petals rather large and crimson with a yellow blotch at base.

Helianthemum nummularium var. *diversifolium*, comb. nov.

H. diversifolium Sweet, Cist. 95, t. (1825-30).

H. mutabile Pers. γ. *diversifolium* K. Koch, Hort. Dendr. 37 (1853).

H. chamaecistus var. η. *diversifolium* Grosser in Engler, Pflanzenr. IV-163, 86 (1903).

This variety has the leaves hirsute above and whitish tomentose beneath, the upper ones linear-lanceolate, acute and revolute at the margin, the lower ones oval, obtuse and flat. The sepals are pilose, and the petals are red with a darker blotch at the base.

Helianthemum nummularium var. *diversifolium* f. *rubro-plenum*, nom. nov.

H. diversifolium β. *multiplex* Sweet, Cist. 98, t. (1825-30).

H. mutabile δ. *multiplex* K. Koch, Hort. Dendr. 37 (1853).

H. vulgare var. *diversifolium multiplex* Bean, Trees & Shrubs Brit. Isl. I. 617 (1914), not *H. nummularium* var. *tomentosum* f. *multiplex* Schneid.

This is a form with double flowers of the preceding variety.

***Hedera nepalensis* K. Koch var. *sinensis*, comb. nov.**

H. Helix Hance in Jour. Bot. xx. 6 (1882).—Hemsley in Jour. Linn. Soc. xxiii. 343 (1888), as to the Chinese plant.—Harms in Bot. Jahrb. xxix. 487 (1900).—Pavolini in Nuov. Giorn. Bot. Ital. n. ser. xv. 418 (1908).—Pampanini in Nuov. Giorn. Bot. Ital. n. ser. xvii. 678 (1910); xviii. 130 (1911).—Hayata, Fl. Mont. Formos. 110 (1910); Icon. Pl. Formos. II. 62 (1912).—Diels in Not. Bot. Gard. Edinburgh, vii. 258, 288 (1912).—Léveillé, Fl. Kouy-Tcheou, 34 (1914).

H. himalaica var. *sinensis* Tobler, Gatt. Hedera, 79, figs. 39–42 (1912).

H. himalaica Harms & Rehder in Sargent, Pl. Wilson. II. 555 (1916), in part.

The difference between the Himalayan and the Chinese plant is quite marked in the leaves of the sterile branches which are more or less pinnately lobed with 2–5 lobes or coarse teeth on each side in the Himalayan plant and only 3-lobed in the Chinese plant, but otherwise the two forms show little difference except that the leaves are generally narrower and longer in the Himalayan plant. In the pinnately lobed leaves of the sterile branches the typical *H. nepalensis* differs from all other species and forms of *Hedera*, and none of the numerous specimens of the Chinese form in the Arboretum Herbarium show any tendency toward pinnate lobing, the leaves of the sterile shoots having never more than two small basal lobes.

When Tobler proposed his *H. himalaica* he overlooked the fact that in 1853 K. Koch (Hort. Dendr. 284) had already given the name *H. nepalensis* to this species basing it on the *H. Helix* of Don's Prodromus and Roxburgh's Flora Indica.

***Rhododendron carolinianum* var. *album*, comb. nov.**

Rhododendron punctatum var. *album* Kelsey, Wholesale Trade List Hardy Am. Pl. 1895–96, 10 (1895), nomen.—Hort. apud Rehder, in Bailey Cycl. Am. Hort. iv. 1523 (1902).—Rehder apud Schneider, Ill. Handb. Laubholz. II. 374 (1909).

Rhododendron carolinianum Margaretae Ashe in Rhodora, xxiii. 177 (1921).

This form differs from typical *R. carolinianum* Rehd. chiefly in the white color of the flowers and in the leaves which are as a rule larger and narrower and more pointed, even short-acuminate at the apex. According to Ashe (l. c.) it is common in North Carolina along the Blue Ridge at an altitude of between 1500 and 4000 ft. in McDowell and Buncombe Counties, and it has also been found in Rutherford, Polk and Henderson Counties, to which may be added Haywood County according to a specimen in this herbarium collected by H. D. House (No. 4563) on Fork Ridge, at 4500 ft. altitude. Ashe states that the white-flowered form has a definite range and is not found together with the typical rose-purple form which occurs at altitudes above 4000 ft. The white-flowered form was first introduced into gardens by Harlan P. Kelsey in 1895 and later repeatedly reintroduced from its native habitat.

Forsythia ovata Nakai in Bot. Mag. xxxi. 104 (1917); Fl. Sylv. Kor. x. 20, t. 3 (1921).

Descriptioni adde: Ramuli hornotini maturi cinereo-flavidi vel flavescentes, sparse lenticellati, secundo anno cinerascentes vel cinerei, cortice

tertio vel quarto anno leviter suberoso et rimis longitudinalibus fisco; medulla septata. Flores solitarii, brevissime pedicellati pedicello toto perulis abscondito; sepala late ovata, apice rotundata, medium corollae tubum aequantia, 2.5 mm. longa; corolla succinea ("amber yellow" ex Ridgway, Color Stand. pl. xvi. 21'b), tubo lato 5 mm. longo intus striis 12 aurantiacis notato, lobis late oblongis 11-12 mm. longis 5-6 mm. latis apice rotundatis vel leviter truncatis; stamna in planta visa microstyla tubum corollae paullo superantia.

Plants raised from seed collected by E. H. Wilson in Korea in 1917 flowered this spring for the first time in this Arboretum. As the flowers have not been described, a description drawn up from the living material is here given. *Forsythia ovata* appears to be a very distinct species; even in its winter state it is easily distinguished from the other species by the pale yellow color of the young branchlets and by the light gray bark of the older branchlets which become slightly corky and split by longitudinal fissures.

Viburnum corymbosum Rehder in Jour. Arnold Arb. III. 214 (December 28, 1922) is antedated by *V. corymbosum* Urban in Fedde, Rep. Spec. Nov. xviii. 121 (August 15, 1922). When I published this new combination based on *Cassine corymbosa* Mill., the August number of Fedde's Repertorium had not yet reached the Arboretum library and I therefore was not aware of the existence of the o. nomencl. I consider it, however, rather fortunate that the publication of Urban's *V. corymbosum* makes it possible to retain the well-known name *V. obovatum* Walt. for the species in question, for the two other older names enumerated by me (l. c.) are non-valid names and cannot replace Walter's name. The first of these names, *Cassine peragua* of 1753 (l. c. 213, footnote 3) is a homonym of his earlier and valid *Cassine peragua* of 1753 (l. c. 213, footnote 3) and *Cassine caroliniana* Lamarck is not valid, because it is a synonym of the earlier and valid *Cassine corymbosa* Miller which, however, as already stated cannot be transferred to the genus *Viburnum*, on account of *V. corymbosum* Urb.

Lonicera subsessilis Rehder in Jour. Arnold Arb. II. 126 (1920); II. 240 (1922).

Lonicera diamantiaca Nakai in Jour. Coll. Sci. Tokyo xliii. 200 (1921).

Descriptioni adde: Frutex ramulis ab initio glabris, plus minusve purpureis vel purpurascensibus; folia juvenilia margine ciliolata et costa media supra minute glandulosa exceptis glabra, supra laete viridia, nitidula, subtus glaucescentia; flores pedunculis ad 3 mm. longis glabris; bracteae triangulare-ovatae, bracteolis breviores, glabrae; bracteolae 2, semi-orbiculares, multo latiores quam longae, tertiam partem ovariorum ad medium vel fere ad apicem connatorum aequantes, circiter 1 mm. longae, margine minutissime glanduloso-ciliatae; dentes calycis 4, lanceolati, circiter 1 mm. longi, basi tantum vel vix connati, minute glandulosi-ciliati; corollae dorso contiguae ad directiones oppositas spectantes, profunde

bilabiatae, 1.2 mm. longae, extus glabrae, initio fere alba vel interdum ad apicem leviter rubescentes, mox flavescentes, leviter fragrantes, tubo 4 mm. longo manifeste gibboso, labio inferiore reflexo, labio superiore erecto intus glabro breviter trilobo lobis rotundato-ovatis concavis circiter 1.5 mm. longis; stamna 4, corollam subaequantia filamentis ad imam basin et ad partem tubo adnatam longe pilosis, tubo cetero intus glabro, antheris linear-i-oblongis 3 mm. longis; stylus stamna paullo superans, basin versus densius infra medium sparse et supra medium sparsissime pilosus; ovarium biloculare loculis plerisque 4-ovulatis.

A plant of *Lonicera subsessilis* raised from seed collected by E. H. Wilson in Korea and received in 1917 flowered this year early in June for the first time in this Arboretum, affording the opportunity to complete the description of this species of which the flowers were before unknown. The species belongs to the division of the subsection Rhodanthae with connate ovaries and red fruit in which *L. conjugialis* Kellogg, *L. Tatari-novii* Maxim., *L. Maximowiczii* Reg., *L. Chamissoi* Bge. and *L. Graebneri* Rehd. belong and is most closely related to the last which has short peduncles and apparently pale-colored flowers, while the others have long and slender peduncles and dark-colored flowers, but *L. Graebneri* is easily distinguished by its pubescent leaves, longer peduncles, longer subulate pilose bracts, setosely ciliate bractlets and longer setosely ciliate sepals. A remarkable feature of this species will be its tetramerous flowers if this turns out to be a specific character and not an abnormal state; the fact that not only in the one shrub which flowered here all flowers without exception showed a 3-lobed upper lip and 4 stamens but that also in the type specimen the young fruits show only 4 calyx-lobes, as far as the latter have not fallen off, would indicate that the tetramerous flowers are a specific character. The only other species of the genus which has occasionally tetramerous flowers is *L. angustifolia* Wall. of the subgenus Isoxylosteum.

× *Lonicera Purpusii* (*L. fragrantissima* × *Standishii*), hybr. nov.

Upright shrub: branchlets glabrous, or particularly the longer vigorous shoots, loosely setose-pilose with reflexed hairs, the young shoots not bloomy; leaves elliptic-ovate or ovate to narrow-elliptic or oblong-ovate, 5–8 cm. long, and 2.5–4 cm. broad, acute to acuminate and mucronate, rounded to broadly cuneate at the base or sometimes the lower ones slightly subcordate, dark green and glabrous above, light green and reticulately veined beneath, and setose-pilose on the midrib and sparingly so on the lateral veins and veinlets or, particularly on the flower-bearing branchlets, nearly glabrous; petioles setose to nearly glabrous. Flowers very similar to those of *L. fragrantissima*, glabrous except some hairs on the margin of the bracts.

SPECIMENS EXAMINED: Botanic Garden, Darmstadt, Germany, A. Purpus 1920 and 1921 (flowers and mature leaves).

This hybrid originated spontaneously some years ago in the Botanic Garden at Darmstadt from seed of one of the parents. In its leaves it is

distinctly intermediate between the parents, their shape being more like that of *L. Standishii* Carr., while in the slighter or nearly wanting pubescence they resemble *L. fragrantissima* Carr. From the latter species the hybrid is chiefly distinguished by the presence of reflexed hairs on the shoots, which are not bloomy when young, the longer and narrower more or less acuminate leaves pale green beneath and often setosely pubescent on the veins and veinlets and by the ciliate bracts; from *L. Standishii* it differs chiefly in the often glabrous branchlets, in the much less hairy and often nearly glabrous leaves and in the glabrous or nearly glabrous flowers.

(*To be continued*)

ERRATA

Page 8, line 15 from above for subcandidanticantibus read subcandidanticibus

" 22, line 9 from above for *Phorodendron* read *Phoradendron*

" 35, line 13 from above for Sect. 2 read Sect. 1.

" 45, line 2 from below for *palustris* read *palustre*

" 192, line 2 from below for *rupetris* read *rupestris*

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